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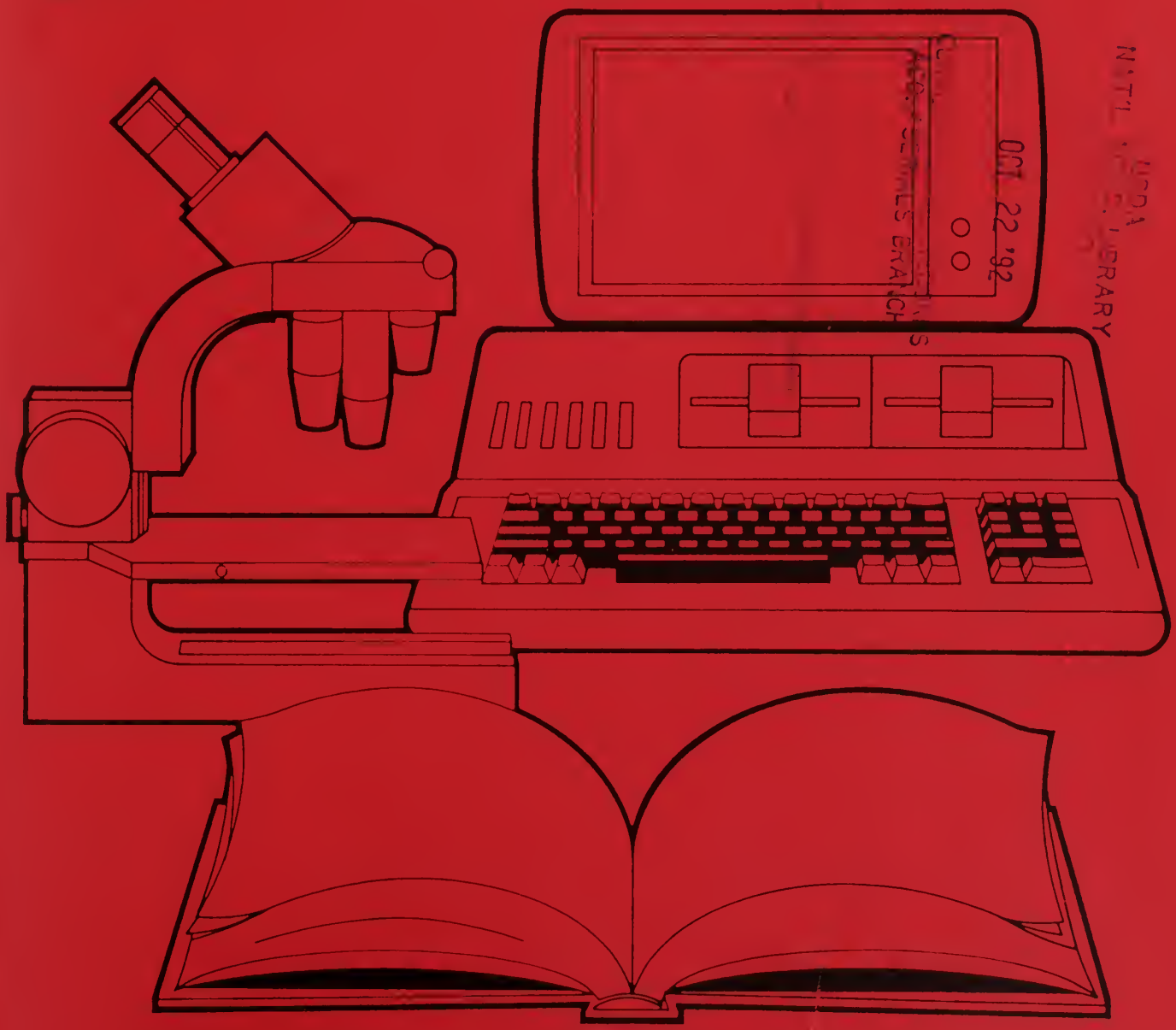
The Protection of Pome Fruits, March 1985 - May 1992

Citations from AGRICOLA Concerning Diseases and Other Environmental Considerations



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Citations from AGRICOLA Concerning Diseases and Other Environmental Considerations

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FOREWORD

This is the 45th volume in a series of commodity-oriented environmental bibliographies resulting from a memorandum of understanding between the U.S. Department of Agriculture, National Agricultural Library (USDA-NAL), and the U.S. Environmental Protection Agency, Office of Pesticide Programs (EPA-OPP).

This close working relationship between the two agencies will produce a series of bibliographies which will be useful to EPA in the regulation of pesticides, as well as to any researcher in the field of plant or commodity protection. The broad scope of information contained in this series will benefit USDA, EPA, and the agricultural community as a whole.

The sources referenced in these bibliographies include the majority of the latest available information from U.S. publications involving commodity protection throughout the growing and processing stages for each agricultural commodity.

We welcome the opportunity to join this cooperative effort between USDA and EPA in support of the national agricultural community.

JOSEPH H. HOWARD, Director
National Agricultural Library

DOUGLAS D. CAMPT, Director
Office of Pesticide Programs

INTRODUCTION

The citations in this bibliography, The Protection of Pome Fruits, March 1985 - May 1992, are selected from the AGRICOLA database and cover diseases, insects, nematodes, weeds, chemicals, and other environmental considerations. A previous bibliography in this series was issued as BLA 41 in 1985.

This is the 45th volume in a series of commodity-oriented listings of citations from AGRICOLA jointly sponsored by the U.S. Department of Agriculture, National Agricultural Library (USDA-NAL), and the U.S. Environmental Protection Agency, Office of Pesticide Programs (EPA-OPP). During the past year, subjects in this series included The Protection of Stored Grains; The Protection of Nut Crops; The Protection of Peanuts; The Protection of Tomatoes, Egg Plants, and Peppers; and The Protection of Lawn and Turf Grasses. Other titles to be issued during the current year are The Protection of Corn, Biotechnology in Agriculture, and Methylbromide and Its Alternatives As Fumigants.

Entries in the bibliography are subdivided into a series of section headings used in the contents of the Bibliography of Agriculture. Each item appears under every section heading assigned to the cited document. A personal author index accompanies this publication. Subject and site indices may be obtained after January 1993 by writing to the address below.

The U.S. Environmental Protection Agency contact for this project is Richard B. Peacock, Office of Pesticides and Toxic Substances.

Any comments or questions concerning this bibliography may be addressed to:

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0022

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0023

Crabapple tree named Red Peacock.
Fiala, J.L. Washington, D.C. : The Office. An ornamental flowering crabapple tree named Red Peacock, having large coral buds opening to soft pink and white ruffled blossoms, mint green disease free foliage, abundant annual blossoms and shiny red berries, early uprightness tending toward maturity into a semiweeping habit, tannish gold bark and stems, and fruit maintenance into early winter. Plant patent - United States Patent and Trademark Office. Sept 12, 1989. (7022). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0024

Crabapple tree named Red Swan.
Fiala, J.L. Washington, D.C. : The Office. An ornamental flowering crabapple tree named Red Swan, having a graceful and small weeping form to 10 feet in maturity, with heavily textured, disease resistant lanceolate leaves. The leaves change in fall to a gold color. Bright red fruit is borne abundantly. The flower buds and blossoms are pendulous, and the initially coral pink buds change to pure white before the blossoms open. Plant patent - United States Patent and Trademark Office. Aug 8, 1989. (6974). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0025

Crabapple tree named Satin Cloud.
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0031

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0032

Malus Coral Cascade.
Ross, H.A. Washington, D.C. : The Office. Named for its graceful, semi-weeping habit and persistant coral-orange fruit, Malus cultivar 'Coral Cascade' offers a unique fall display among crabapple cultivars with a weeping habit.

The abundant load of large pea-sized ornamental fruit causes its slender horizontal branches to droop in a cascade of reddish-orange color. Its annual fruit production results in a permanent downward arching of the branches as the plant ages. This crabapples small stature (15' tall X 20' wide in 30 years) makes it desirable for use in prominant landscape locations, elevated planters, and beneath power lines. The spring flower display starts with pinkish-red buds on pendulous pedicels of about 1.5" (4 cm) in length. The abundant flowers open white with the abaxial edges of the petals remaining pink. 'Coral Cascade' has an established record of disease resistance. Its thick, green leaves retain their high quality until fall frosts trasform them to golden hues of yellow, orange and tan. Plant patent - United States Patent and Trademark Office. Feb 6, 1990. (7142). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0033

Malus hupehensis named 'Cardinal'.
Flemer, W. III. Washington, D.C. : The Office. A Malus hupehensis tree providing abundant red flowers and small, very glossy red fruits, having resistance to defoliation in hot humid summers and to leaf injury from apple scab fungus or mildew which severely affects other similar trees in an adjacent area, the tree growing rapidly and displaying a wide spreading crown. Plant patent - United States Patent and Trademark Office. Feb 13, 1990. (7147). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0034

Pear tree--'Elliot'.
Ryugo, K. Washington, D.C. : The Office. A new and distinct variety of pear tree primarily characterized by its tolerance to the fire-blight organism. (Erwinia amylovora), and further characterized by a blooming habit concurrent with 'Bartlett'; skin with firm and buttery texture, and fruit with a flavor which is excellent to good. The keeping quality of the fruit is good to excellent. Plant patent - United States Patent and Trademark Office. Dec 6, 1988. (6452). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0035

Pear tree--Red Winter.
Zanzi, G. Washington, D.C. : The Office. A new and distinct asexually reproduced pear tree called Red Winter, as illustrated and described. The fruit is large, light yellow-red in color and has a very sweet flavor. It ripens approximately thirty-five days after the William Barlett variety and has an exceptionally long shelf life under the conditions existing in the Ferrara region of Northern Italy. Plant patent - United States Patent and Trademark Office. July 4, 1989. (6897). 1 p. plates. (NAL Call No.: DNAL 156.65 P69).

0036

Pear tree Old Home X Farmingdale variety No. 87.
Brooks, L.A. Washington, D.C. : The Office. This invention relates to a new and distinct variety of pear tree which is useful as a size-controlling rootstock. The new variety originated as a single seedling selected from a large group of pear seedlings which were grown from open-pollinated seed. This seed was collected from Old Home Pear Trees (Pyrus communis) growing in an isolated planting with Farmingdale pollinizers. Pear fruiting varieties propagated on the under stock of this new rootstock variety are approximately 80% of the size of like pear trees growing on domestic Bartlett seedling rootstocks. This "semi-dwarfing" selection is easily asexually reproduced; particularly by hardwood cuttings. It has proven to be graft compatible with all commercially grown pear varieties. It was selected for its non-rootsuckering habit, its resistance to Fireblight disease and its tolerance of Pear Decline disease. It has also proven to be hardy, early bearing and well anchored in the many areas and soil types where it was tested. It has proven to be adaptable to Northern pear growing areas such as Summerland, British Columbia, Harrow, Ontario, and Kentsville, Nova Scotia, Canada, having been selected to fill these Northern pear growing rootstock needs. Plant patent - United States Patent and Trademark Office. Nov 1, 1988. (6362). 3 p. plates. (NAL Call No.: DNAL 156.65 P69).

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Can the apple industry meet the challenges in the future?.
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NEMFA. Gerling, W.D. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Statistics for 1984. 1986. v. 92. p. 28-35. (NAL Call No.: DNAL 81 M384).

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Stout, T.T. Uchida, S.A.; Funt, R.C. Wooster, Ohio : The Center. Research bulletin - Ohio Agricultural Research and Development Center. Aug 1991. (1188). 20 p. Includes references. (NAL Call No.: DNAL 100 OH3S (2)).

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trees/ha, all cultivars; and pyramid hedgerow (PH), 425 trees/ha, Golden Delicious' and Topred Delicious'. Yields of Golden Delicious' in the SS and TR were similar during the first 7 years and these systems generally produced higher yields than the less-intensive systems IH and PH) during this period. Except for a drop in yield in the TR system in year 10, Golden Delicious' trees >8 years old in all systems produced >50 t.ha-1. Topred' in the TR system outyielded IH and PH every year, while IH had higher yields than PH in three out of the eight cropping years. The spur-type cultivars Sundale and Millersturdeespur had lower yields per hectare than the standard-habit cultivars because they were spaced too widely. Yields of the systems with Sundale' generally followed plant density, with the SS being highest, IH lowest, and TR in between and often not significantly different from the other two systems. Orchard management systems had no consistent effects on fruit size. The cumulative yield per hectare of Golden Delicious' over 11 years grown as SS outproduced the IH and PH systems, with the TR yields intermediate. Sundale' managed as SS outproduced both the TR and IH systems. Topred' in the TR had higher cumulative yields per hectare than the PH system. An economic comparison of the Golden Delicious' systems indicated that PH provided the highest rate of return and the SS the lowest, with the IH and TR systems intermediate. Journal of the American Society for Horticultural Science. Nov 1989. v. 114 (6). p. 863-868. Includes references. (NAL Call No.: DNAL 81 S012).

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Annual deblossoming increases fire blight susceptibility of 'Golden Delicious'/M.9 apple trees.
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Apple thinning by photosynthetic inhibition.
JOSHB. Byers, R.E. Barden, J.A.; Polomski, R.F.; Young, R.W.; Carbaugh, D.H. Alexandria, Va. : The Society. Shading (92%) of 'Redchief Delicious' apple (Malus domestica Borkh.) trees for 10-day periods from 10 to 20, 15 to 25, 20 to 30, and 25 to 35 days after full bloom (DAFB) caused greater fruit abscission than shading from 5 to 15, 30 to 40, 35 to 45, or 47 to 57 DAFB. Fruit 8 to 33 mm in diameter (10 to 30 DAFB) were very sensitive to 10 days of shade, even though fruit sizes of 6 to 12 mm are considered the most sensitive to chemical thinners. In a second test, shading for 3 days caused fruit thinning; 5 days of shade in the periods 18 to 23, 23 to 28, and 28 to 33 DAFB caused greater thinning than 11 to 16 or 33 to 38 DAFB. Shading reduced photosynthesis (Pn) to about one-third that of noncovered trees. Terbacil (50 mg(liter-1) + X-77 surfactant (1250 mg.liter-1) applied with a handpump sprayer 5, 10, or 15 DAFB greatly reduced fruit set and caused some leaf yellowing, particularly in the earliest treatments. Terbacil reduced Pn by more than 90% at 72 hours after application. Shoot growth of trees defruited by shade or terbacil was equivalent to defruited or deblossomed trees; ethephon (1500 mg(liter-1) inhibited tree growth and defruited trees. No terbacil residues were dectected in fruit at harvest from applications made 5, 15, 20, 25, or 30 DAFB. Eleven of 12 photosynthesis-inhibiting herbicides were also found to thin 'Redchief Delicious' apple trees. Shading caused more thinning than terbacil at the later applications, which may reflect poorer absorption and/or lesser photosynthetic inhibition than when terbacil was applied to older leaves. Journal of the American Society for Horticultural Science. Jan 1990. v. 115 (1). p. 14-19. Includes references. (NAL Call No.: DNAL 81 SO12).

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Apples on the Lincoln canopy--mechanized management.
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Bitter pit control by sprays and vacuum infiltration of calcium in 'Cox's Orange Pippin' apples.
HJHSA. Hewett, E.W. Watkins, C.B. Alexandria, Va. : American Society for Horticultural Science. The incidence of external and internal bitter pit in 'Cox's Orange Pippin' apple (Malus domestica Borkh.) fruit sprayed with normal therapeutic sprays either with or without Ca salts at 2-week intervals during the growing season was determined after 6 weeks of storage over 7 consecutive years. Following harvest, fruit was either vacuum-infiltrated with $CaCl_2$, or received no further treatment. Although there was a tendency for fruit that had been sprayed and vacuum-infiltrated with Ca to exhibit the greatest degree of bitter pit control, this treatment was not significantly superior to Ca sprays alone. Vacuum infiltration alone reduced the disorder to a lesser extent than Ca sprays and was more effective in reducing external than internal bitter bit. The results suggest that Ca applications over the growing season are superior to postharvest vacuum-infiltration with Ca in the prevention of bitter pit. HortScience. Mar 1991. v. 26 (3). p. 284-286. Includes references. (NAL Call No.: DNAL SB1.H6).

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A Computer management system for Apple ("Malus X domestica" Borkh.) germplasm with resistance to disease and arthropod pests /H.F. Goonewardene ... et al. . --.
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MUCBA. Peterson, C. Heatley, R. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Apr 1989. (2177). 8 p. ill. (NAL Call No.: DNAL 275.29 M58B).

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Daminozide, paclobutrazol and uniconazol effects on 'McIntosh' apples at harvest and following air storage.
PPGGD. Elfving, D.C. Lougheed, E.C.; Chu, C.L.; Cline, R.A. Lake Alfred, Fla. : The Society. Proceedings of the Plant Growth Regulator Society of America. Meeting held August 6-10, 1989, Arlington, Virginia. 1989. (16th). p. 40-41. Includes references. (NAL Call No.: DNAL SB128.P5).

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Daminozide, root pruning, trunk scoring, and trunk ringing effects on fruit ripening and storage behavior of 'McIntosh' apple.
JOSHB. Elfving, D.C. Lougheed, E.C.; Cline, R.A. Alexandria, Va. : The Society. A midsummer foliar daminozide (DZ) application (750 mg a.i./liter) to 'Macspur McIntosh'/M.7 apple trees (Malus domestica Borkh.) reduced preharvest drop and retarded flesh firmness loss and starch hydrolysis when tested at harvest; DZ also reduced fruit ethylene production at harvest and after 19 weeks of storage at 0.5C. Root pruning at full bloom (May) resulted in increased soluble solids concentration (SSC) and firmer flesh and less starch hydrolysis at harvest, but not consistently each year. Full-bloom root pruning reduced the incidence of stem-cavity browning and brown core, but again not each year. Full-bloom root pruning did not influence ethylene evolution at harvest but did reduce post-storage ethylene evolution in two of three seasons. Full-bloom root pruning generally was less effective than DZ in altering fruit behavior, while root pruning later than full bloom had virtually no effect. Trunk scoring or ringing increased SSC and retarded loss of

flesh firmness before harvest and following storage, but had little effect on starch hydrolysis. Scoring or ringing decreased incidence of some disorders and reduced post-storage ethylene evolution, although these treatments had little effect on ethylene production at harvest. Trunk scoring influenced some fruit characteristics more strongly than DZ. Fruit size was not affected by any treatment in any year. Journal of the American Society for Horticultural Science. Mar 1991. v. 116 (2). p. 195-200. Includes references. (NAL Call No.: DNAL 81 S012).

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Facteau, T. Portland : The Society. Annual report - Oregon Horticultural Society. 1986. v. 77. p. 101-112, 114-117. Includes references. (NAL Call No.: DNAL 81 OR32).

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Derivation of DRIS norms from a high-density apple orchard established in the Quebec Appalachian Mountains.
JOSHB. Parent, L.E. Granger, R.L. Alexandria, Va. : The Society. Diagnosis and Recommendations Integrated System (DRIS) norms for trees on dwarfing rootstocks were derived from a 7-year fertilization trial on a Blanford loam (coarse loamy, mixed, frigid Typic Fragiorthod) in southern Quebec. Morspur McIntosh' (Malus domestica Borkh.) scions budded on M.7, M.26, Ott.3, or M.9 dwarfing rootstocks received 12 fertilization regimes involving N-, P-, K-, Ca-, and Mg-based materials applied at three rites each. Top yielding trees on Ott.3 had lower Mg concentration in their leaves than those on other rootstocks. Year-to-year variation of DRIS norms led to yearly defined DRIS norms. Annual yields can be used instead of cumulative yields to generate DRIS norms, especially from the 6th year after planting. If tissue samples are collected at the appropriate sampling period, incorporating the dry matter index into the nutrient balance equation (M-DRIS) of orchard trees helps to separate limiting from nonlimiting nutrients and also integrates numerical information on nutrient concentrations and nutrient ratios. These concentrations and ratios are commonly diagnosed independently or concomitantly with the sufficiency range approach and with DRIS, respectively, M-DRIS may be particularly useful when available critical values are not fully satisfactory, as was the case in this investigation. Journal of the American Society for Horticultural Science. Nov 1989. v. 114 (6). p. 915-919. Includes references. (NAL Call No.: DNAL 81 S012).

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Chen, T.H.H. Murakami, P.; Lombard, P.; Fuchigami, L.H. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1991. v. 9 (1). p. 13-17. Includes references. (NAL Call No.: DNAL SB1.J66).

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Division of Entomology /C.H. Fernald. Division of Horticulture / Samuel T. Maynard.
Fernald, C. H. 1838-1921. Maynard, Samuel T._1844-1923. Amherst, Mass. : Hatch Experiment Station of the Massachusetts Agricultural College, 1888. 35 p. : ill. ; 23 cm. (NAL Call No.: DNAL 100 M38H (1) no.2).

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Fernald, C. H. 1838-1921. Maynard, Samuel T._1844-1923.; Warner, Clarence Duane. Amherst, Mass. : Hatch Experiment Station of the Massachusetts Agricultural College, 1888. 16 p. : ill. ; 23 cm. (NAL Call No.: DNAL 100 M38H (1) no.1).

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Early performance and economic value of feathered apple trees on semi-standard rootstocks.
JOSHB. Ferree, D.C. Rhodus, W.T. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1987. v. 112 (6). p. 906-909. Includes references. (NAL Call No.: DNAL 81 S012).

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An economic analysis of orchard rejuvenation in response to the reduction or the elimination of the use of Alar.
NEMFA. Kimball, M. Autio, W.R. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 44-52. (NAL Call No.: DNAL 81 M384).

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Effect of a topically applied whitener on sun damage to Granny Smith apples.
CAGRA. Sibbett, G.S. Micke, W.C.; Mitchell, F.G.; Mayer, G.; Yeager, J.T. Oakland, Calif. : Division of Agriculture and Natural Resources, University of California. California

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Effect of Aphis pomi (Homoptera: Aphididae) density on apples.
JEENAI. Hamilton, G.C. Swift, F.C.; Marini, R. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1986. v. 79 (2). p. 471-478. Includes references. (NAL Call No.: DNAL 421 J822).

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Effect of early season foliar sprays of GA4+7 on russeting and return bloom of 'Golden Delicious' apple.
HJHSA. Meador, D.B. Taylor, B.H. Alexandria, Va. : American Society for Horticultural Science. HortScience. June 1987. v. 22 (3). p. 412-415. Includes references. (NAL Call No.: DNAL SB1.H6).

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The effect of orchard floor management on tree growth.
ARHMA. Parker, M. Hull, J. Jr. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1989. (119). p. 80-88. (NAL Call No.: DNAL 81 M58).

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Effect of paclobutrazol and analogs on growth, yield, fruit quality, and storage potential of 'Delicious' apples.
JOSHB. Greene, D.W. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. May 1986. v. 111 (3). p. 328-332. Includes references. (NAL Call No.: DNAL 81 S012).

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Effect of rosy apple aphid and spirea aphid (Homoptera: Aphididae) on dry matter accumulation and carbohydrate concentration in young apple trees.
JEENAI. Varn, M. Pfeiffer, D.G. Lanham, Md. : Entomological Society of America. One-year-old apple trees grown in pots were artificially infested with either Dysaphis plantaginea (Passerini) or Aphis spiraecola Patch. Feeding by D. plantaginea on 22-53% of the leaves on the tree significantly reduced accumulation of dry weight in all portions of the trees during the first season's growth. At the 10-leaf stage of the second season, dry weights of trees infested with D. plantaginea during the previous year were still significantly lower than those of control trees. A spiraecola did not reduce the accumulation of dry weight by the young trees. Journal of economic entomology. Apr 1989. v. 82 (2). p. 565-569. Includes references. (NAL Call No.: DNAL 421 J822).

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Effect of seasonal soil waterlogging on vegetative growth and fruiting of apple trees.
JOSHB. Olien, W.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Mar 1987. v. 112 (3). p. 209-214. ill. Includes references. (NAL Call No.: DNAL 81 S012).

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Effect of soil management and calcium nitrate fertilization on the availability of soil nitrate and cations in an eastern apple orchard.
JOSHB. Glenn, D.M. Miller, S.S.; Habecker, M.A. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. May 1987. v. 112 (3). p. 436-440. Includes references. (NAL Call No.: DNAL 81 S012).

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Effect of urea nitrogen on fruitfulness and fruit quality of Starkspur Golden Delicious apple trees.
JPNUDS. Tami, M. Lombard, P.B.; Righetti, T.L. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1986. v. 9 (1). p. 75-85. Includes references. (NAL Call No.: DNAL QK867.J67).

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Effects of daminozide and paclobutrazol treatments on fruit ripening and storage behavior of 'McIntosh' apple.
JOSHB. Elfving, D.C. Chu, C.L.; Lougheed, E.C.; Cline, R.A. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1987. v. 112 (6). p. 910-915. Includes references. (NAL Call No.: DNAL 81 S012).

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Effects of daminozide, paclobutrazol, and uniconazole treatments on 'McIntosh' apples at harvest and following storage.
JOSHB. Elfving, D.C. Lougheed, E.C.; Chu, C.L.; Cline, R.A. Alexandria, Va. : The Society. Foliar daminozide (DZ) applications to 'McIntosh' apple trees (Malus domestica Borkh.) increased fruit color, reduced preharvest drop, resulted in greater firmness at harvest and after air storage, delayed starch hydrolysis, and reduced fruit ethylene production at harvest and after storage. Foliar paclobutrazol

(PBZ) reduced preharvest drop and flesh firmness loss if applied within 5 weeks after full bloom (WAFB). Later applications had no effect. PBZ did not influence the progress of starch hydrolysis or ethylene production at harvest but reduced poststorage ethylene production in one season. Stem-cavity browning and brown core were increased by PBZ applied at 5 and 9 WAFB in 1987. In 1988, fruit soluble solids content (SSC) was reduced by a double application of PBZ and by uniconazole (UCZ). UCZ had little effect on 'McIntosh' fruit other than the reduction in SSC. PBZ applications were less consistent in their effects than DZ. Journal of the American Society for Horticultural Science. Sept 1990. v. 115 (5). p. 750-756. Includes references. (NAL Call No.: DNAL 81 SO12).

0202

Effects of fungicides that inhibit ergosterol biosynthesis on apple powdery mildew control, yield, and fruit growth factors.
PLDRA. Spotts, R.A. Cervantes, L.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1986. v. 70 (4). p. 305-306. Includes 16 references. (NAL Call No.: DNAL 1.9 P69P).

0203

The effects of root pruning on apples.
CFRTA. Schupp, J.R. Ferree, D.C. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. 1987. v. 20. p. 76-80. ill. Includes references. (NAL Call No.: DNAL 93.5 D96).

0204

Estimated cost of replanting to a high density Fuji apple orchard on full dwarf rootstock in central Washington.
WUEXA. Hinman, H. Peterson, B.; Williams, K.; Maib, K. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Includes statistical data. Aug 1991. (1635). 34 p. Includes references. (NAL Call No.: DNAL 275.29 W27P).

0205

Evaluation of apple fruit maturity to segregate fruit for optimum storage potential.
ARHMA. Beaudry, R.M. Dilley, D.R. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 193-194. (NAL Call No.: DNAL 81 M58).

0206

Evaluation of benzyladenine as a chemical thinner on 'McIntosh' apples.
JOSHB. Greene, D.W. Autio, W.R. Alexandria, Va. : The Society. Five chemical thinning trials, conducted over 4 years, indicated that BA is an effective thinner for 'McIntosh' apples (Malus domestica Borkh.). Although it can thin at concentrations as low as 25 mg.liter-1, in most years a higher concentration was required to thin adequately. It appeared that 14 to 18 days after full bloom, when fruit size was about 10 mm, may be the period when maximum thinning was achieved. Greater thinning occurred when BA and carbaryl were combined than when they were used individually. BA increased fruit weight, flesh firmness, and soluble solids content at harvest relative to no thinning. The storage life of fruit treated with BA was less than that of fruit from nonthinned trees, but this effect may have been an indirect response related to the larger fruit size rather than a direct response to the chemical. BA caused thinning and induced lateral branching simultaneously on young 'Macspur McIntosh' trees. Therefore, crop load on trees just coming into production may be significantly reduced when BA is used to induce lateral branching. Chemical names used: N-(phenylmethyl)-IH-purine-6-amine benzyladenine (BA), 1-napthaleneacetic acid NAA , 1-napthalenyl methylcarbamate carbaryl . Journal of the American Society for Horticultural Science. Jan 1989. v. 114 (1). p. 68-73. Includes references. (NAL Call No.: DNAL 81 SO12).

0207

An evaluation of stop drop materials in 1986.
NEMFA. Greene, D.W. Kaminsky, K.; Sincuk, J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 74-78. (NAL Call No.: DNAL 81 M384).

0208

An expert system for apple orchard management.
AAEPC. Heinemann, P.H. Travis, J.W.; Rajotte, E.G.; Bowser, T. St. Joseph, Mich. : The Society. Paper - American Society of Agricultural Engineers. Paper presented at the 1989 International Summer Meeting, June 25-28, 1989, Quebec, PQ, Canada. Summer 1989. (89-7038). 18 p. Includes references. (NAL Call No.: DNAL 290.9 AM32P).

0209

Federal loans only help for state's frosted-ravaged apple growers.
Shannon, M. Tempe, Ariz. : The Journal. Arizona farmer-stockman. Aug 1988. v. 67 (8). p. 30-31. ill. (NAL Call No.: DNAL 6 AR44).

0210

Fertilizing fruit in small areas.
Hayden, R.A. West Lafayette, Ind. : The Service. HO - Purdue University, Cooperative Extension Service. Mar 1987. (109,rev.). 2 p. (NAL Call No.: DNAL SB21.I6P8).

0211

Field performance of Malus sargentii as a rootstock for four commercial apple varieties.
FVRJA. Olien, W.C. Stiles, W.C.; McCrum, R.C. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1986. v. 40 (4). p. 140-143. Includes references. (NAL Call No.: DNAL 80 F9464).

0212

Financial analysis of an apple orchard in southeastern Arizona.
Wade, J.C. Wright, N.G.; Kilby, M.W. Tucson, Ariz. : The Service. Publication - Cooperative Extension Service, University of Arizona, College of Agriculture. Dec 1986. (8662). 12 p. (NAL Call No.: DNAL S544.3.A6C6).

0213

The flowering crabapple.
Witt, M.L. Hartman, J.R.; Jones, R.T.; McNiel, R.E. Lexington : The Service. ID - University of Kentucky, Cooperative Extension Service. Apr 1985. (68). 6 p. ill. (NAL Call No.: DNAL S544.3.K4K42).

0214

Fluidized bed material applied at disposal levels: effects on an apple orchard.
JEVQAA. Korcak, R.F. Madison, Wis. : American Society of Agronomy. Atmospheric fluidized-bed combustion represents an economical technology for the burning of high S fossil fuel. The combustion residue is a dry, alkaline material resulting from the burning of coal (or other fuel source) and limestone. Although the residue has been assessed as a limestone substitute, the current study examines the potential for disposing of relatively large quantities. Fluidized bed material (FBM) was applied at two rates to the surface area within the rows of an established apple (Malus domestica Borkh.) orchard containing four tree types. The rates were either 9.2 kg/m2 (low rate), 36 kg/m2 (high rate), or untreated control. The tree types used were 'Spuree Rome' on M9, 'Redchief Delicious' on M9 or M9/MM106, and 'Sturdeespur Delicious' on M9. Cumulative yields (kg/tree) were enhanced on three of four tree types over a period of 6 yr. A 15% reduction in yield was noted for Redchief Delicious on M9/MM106 stocks at the high FBM rate. No nutritional related problems were noted for this or any other of the the tree types used. Part of the yield reduction noted was due to fruit size differences and/or differential sensitivity of this interstock/rootstock combination to the altered soil chemical properties. Generally, amended soil pH increased to about 7.0 for either rate, and electrical conductivity increased five fold at the high rate of FBM addition. Agricultural utilization of large volumes (up to 112 Mg/ha) of FBM, compared to past research whereFBM was used as a lime substitute (2-6 mg/ha), appears to be a feasible alternative. However, rootstock selection for apple may need to consider the resultant changes in soil chemical status from FBM additions. Journal of environmental quality. July/Sept 1988. v. 17 (3). p. 469-473. Includes references. (NAL Call No.: DNAL QH540.J6).

0215

The fresh apple market: riding out the rough waves.
Gyawu, D.A.T. Washington, D.C. : The Service. Foreign Agriculture Circular. Horticultural products - FHORT - United States Department of Agriculture, Foreign Agricultural Service. Mar 1986. (3-86). p. 7-13. (NAL Call No.: DNAL aSB319.4.F6).

0216

Fruit abscission and fruit quality of apples following use of dicamba to control preharvest drop.
JOSHB. Marini, R.P. Byers, R.E.; Sowers, D.L.; Young, R.W. Alexandria, Va. : The Society. Five apple (Malus domestica Borkh.) cultivars were treated with dicamba at concentrations of 0 to 200 mg.liter-1 during 3 years. Although the response varied with cultivar, dose, and year, dicamba always delayed fruit abscission. At similar concentrations, dicamba usually reduced fruit drop more than NAA, but less than fenoprop. Dicamba at 10 mg.liter-1 effectively delayed drop of 'Delicious', whereas 20 to 30 mg.liter-1 was required for 'Red Yorking', 'Rome', 'Winesap', and 'Stayman'. Dicamba did not influence flesh firmness, soluble solids content, water core, or starch content at harvest or after storage. Journal of the American Society for Horticultural Science. May 1990. v. 115 (3). p. 390-394. Includes references. (NAL Call No.: DNAL 81 S012).

0217

Fruit size--the moneymaker.
PWHAA. Schotzko, T. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 92-96. (NAL Call No.: DNAL 81 W273).

0218

Gala, a new early-maturing apple variety.
Stebbins, R.L. Corvallis, Or. : The Service. PNW bulletin - Pacific Northwest Extension Publication, Washington, Oregon, and Idaho State Universities, Cooperative Extension Service. July 1987. (319). 4 p. ill. (NAL Call No.: DNAL 275.29 W27PN).

0219

Gearing up for the record crop.
WEFGA. Stockwin, W. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Sept 1987. v. 107 (9). p. 8H. ill. (NAL Call No.: DNAL 80 G85W).

0220

The Georgian Bay apple industry.
CFRTA. Wilson, K.R. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. 1987. v. 20. p. 51-53. (NAL Call No.: DNAL 93.5 D96).

0221

Georgia's apples for flavor and freshness, they're the pick of the crop.
Walk, J. Atlanta, Ga. : Georgia Electric Membership Corporation. Rural Georgia. Oct 1989. v. 45 (10). p. 4. ill. (NAL Call No.: DNAL 335.8 R887).

0222

Gibberellins A4+7 influence fruit set, fruit quality, and return bloom of apples.
JOSHB. Greene, D.W. Alexandria, Va. : The Society. Several experiments were conducted to evaluate the influence of time, concentration, and number of GA4+7 applications on 'McIntosh', 'Early McIntosh', and 'Empire' apples (Malus domestica Borkh.). GA4+7 at 150 mg/liter increased fruit set and inhibited flower bud formation on 'McIntosh' and 'Early McIntosh'. Flower bud formation was inhibited on 'McIntosh' when GA4+7 was applied over a wide range of times from 6 days before full bloom to 34 to 35 days after full bloom. Applications made 45 and 60 days after full bloom had no effect. Following storage, 'Empire' fruit treated with GA4+7 were softer and had a higher incidence of senescent breakdown than controls. Postbloom sprays of GA4+7 increased fruit set on 'Empire' one year when applied from 0 to 150 mg/liter, while two applications of 50 mg/liter on similar trees in another year caused thinning. GA4+7 sprays appeared to advance ripening of 'Empire' apples. Gibberellin sprays reduced seed number. GA4+7 inhibited flowering in 'Empire'. Repeat applications 19 and 34 days after full bloom were only slightly more inhibitory to flowering than one application of 0, 50, 100, or 150 mg/liter made 10 days after full bloom. Journal of the American Society for Horticultural Science. July 1989. v. 114 (4). p. 619-625. Includes references. (NAL Call No.: DNAL 81 SO12).

0223

Grower production costs.
NEMFA. Gerling, W.D. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Statistics for 1984. 1986. v. 92. p. 28-35. (NAL Call No.: DNAL 81 M384).

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Growing pears in North Carolina.
Williams, K.M. Werner, D.J. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. June 1987. (80,rev.). 13 p. ill. Includes references. (NAL Call No.: DNAL S544.3.N6N62).

0225

Growing quality apples without alar.
Williams, K.M. Pullman, Wash. : Washington State University Cooperative Extension. Postharvest pomology newsletter. May 1989. v. 7 (1). p. 14-15. (NAL Call No.: DNAL TP440.P67).

0226

Growth regulators and herbicides for delaying apple fruit abscission.
HJHSA. Marini, R.P. Byers, R.E.; Sowers, D.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Dec 1989. v. 24 (6). p. 957-959. Includes references. (NAL Call No.: DNAL SB1.H6).

0227

Harvest date and CA storage management effects on quality of processed apple slices.
JFDAZ. McLellan, M.R. Blanpied, G.D.; Massey, L.M. Chicago, Ill. : The Institute. The effect of harvest date and various controlled atmosphere CA delays was studied on an apple slice production line. Harvest date interacted with delay in placing apples under CA conditions, causing dramatic softening of the blanched apple slices. The effect on the blanched slices was much greater than that on raw slices. Numerous process parameters including waste amounts and yields were notably affected by various treatment combinations. Journal of food science : an official publication of the Institute of Food

Technologists. July/Aug 1990. v. 55 (4). p. 1046-1048. Includes references. (NAL Call No.: DNAL 389.8 F7322).

0228

High density fruit production systems of the world.
PWHAA. Blizzard, S. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1986. (82nd). p. 10, 12, 14, 16. (NAL Call No.: DNAL 81 W273).

0229

High density pear planting and management on quince dwarfing rootstock: a practical venture.
CFRTA. Tehrani, G. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. 1987. v. 20. p. 142-146. (NAL Call No.: DNAL 93.5 D96).

0230

How can we grow and maintain quality apples and cherries.
ARHMA. Carpenter, W.S. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1986. (116th). p. 96-100. (NAL Call No.: DNAL 81 M58).

0231

How can we grow and maintain quality apples and cherries.
ARHMA. Rasch, F. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1986. (116th). p. 93-95. (NAL Call No.: DNAL 81 M58).

0232

How spur quality influences fruit size.
PWHAA. Rom, C.R. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 109-118. 111. Includes references. (NAL Call No.: DNAL 81 W273).

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How we can grow and maintain quality apples.
ARHMA. Rasch, T. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1986. (116th). p. 90-93. (NAL Call No.: DNAL 81 M58).

0234

IMP 1991 commercial apple: insect, disease, and weed control recommendations.
Patterson, M.G. Everest, J.W. Auburn, Ala. : The Service. Circular ANR - Alabama Cooperative Extension Service, Auburn University. In subseries: Integrated Pest Management. Dec 1990. (11). 11 p. (NAL Call No.: DNAL S544.3.A2C47).

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Impacts of the University of Connecticut integrated pest management program for apples 1984-1987 /prepared by: Roger G. Adams, Lorraine M. Los.
Adams, Roger G. Los, Lorraine M. Connecticut : Cooperative Extension System, University of Connecticut, College of Agriculture and Natural Resources, 1990? . Cover title.~ "90-22.". 24 p. : ill. ; 28 cm. (NAL Call No.: DNAL SB608.A6A33 1990).

0236

Influence of orchard management systems on spur quality, light, and fruit within the canopy of 'Golden Delicious' apple trees.
JOSHB. Ferree, D.C. Alexandria, Va. : The Society. Trees of Golden Delicious' apple (Malus domestica Borkh.) were established in 1973 in the following orchard management systems: slender spindle (SS), trellis (TR), interstem hedgerow (IH), and pyramid hedgerow (PH). Spur quality and percent photosynthetic photon flux (PPF) transmission declined from the top to the bottom of the canopy of all systems. The three conical central leader type trees (SS, IH, PH) produced a quarter of their fruit on or close to the central leader, while the palmette-shaped TR produced 60% in the center sections along the wire trellis. There was no difference between vertical fruit distribution in trees in the more intensive systems (SS, TR), but the larger trees (IH, PH) produced twice as much fruit in the top half of the canopy as in the bottom half. Trees in the SS had a lower percentage or PPF transmission values within the canopy than trees in the TR systems. Trees in IH generally had higher PPF transmission values within the canopy than the larger PH trees. The number of leaves per spur and specific leaf weight of spur leaves generally followed the light distribution pattern, and trees in the TR and IH systems had higher-quality spurs than the SS and PH systems. The SS and TR systems appeared more responsive to the orientation of the sun, having higher light transmission values on the east side of the canopy in the morning and west side in the afternoon, than the IH or PH systems. Journal of the American Society for Horticultural Science. Nov 1989. v. 114 (6). p. 869-875. Includes references. (NAL Call No.: DNAL 81 SO12).

0237

Influence of planting depth on growth of young apple trees.
Lyons, C.G. Jr. Byers, R.E.; Yoder, K.S. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Dec 1987. v. 5 (4). p. 163-164. Includes references. (NAL Call No.: DNAL SB1.J66).

0238

Influence of pruning and urea sprays on growth and fruiting of spur-bound Delicious' apple trees.
JOSHB. Ferree, D.C. Forshey, C.G. Alexandria, Va. : The Society. Spur quality and leaf nutritional levels were determined in various canopy sections of mature spur-bound 'Delicious'-type apple (Malus domestica Borkh.) trees and then various pruning and foliar urea treatments were applied to alter growth and improve fruit size. Fruit size declined from the top to the bottom of the canopy of mature spur-bound 'Starkrimson Delicious' trees with a similar pattern in the following criteria: leaf area/spur, spur specific leaf weight, and spur bud diameter. Spur leaf area was higher in the top center and east sections than in the top south. Spur bud diameter in the bottom third of the canopy was highest in the north and east sections, lowest in the central section, and intermediate in the south and west sections. Concentrations of leaf Mn, Zn, B, Al, and Na tended to increase from the top to the bottom of the canopy. Four urea sprays (6 g urea/liter) during the cell division period of fruit growth had little influence on spur quality, but fruit weight was increased 3 successive years. Spur pruning of 25-year-old 'Starkrimson Delicious' trees was not sufficient to increase shoot growth or improve spur quality, but heading back into 2-year-old wood plus spur pruning increased shoot number by 38%. Spur and heading-back pruning increased the number of shoots and total shoot leaf area of 13-year-old 'Red Chief Delicious' trees, and the combination of both pruning types led to the greatest increase. Heading-back of the younger trees increased leaf area of both shoots and spurs and spur pruning also increased leaf area/spur. Heading-back pruning increased average fruit weight, and the increase was positively correlated with total leaf area, shoot leaf area, and number of shoot leaves/mm of branch circumference. Journal of the American Society for Horticultural Science. Sept 1988. v. 113 (5). p. 699-703. Includes references. (NAL Call No.: DNAL 81 SO12).

0239

Influence of soil on fruit production.
NEMFA. Veneman, P.L.M. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 56-60. Includes references. (NAL Call No.: DNAL 81 M384).

0240

Internal control of pear flowering and fruit development.
PWHAA. Lombard, P.B. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1986. (82nd). p. 149-160. ill. Includes references. (NAL Call No.: DNAL 81 W273).

0241

Intraseasonal supply and demand functions for apples / by E.C. Pasour, Jr. and Robert L. Gustafson .
Pasour, E. C. Gustafson, Robert L. East Lansing, Mich. : Agricultural Experiment Station, Michigan State University, 1966. Cover title. 89 p. ; 24 cm. Bibliography: p. 87-89. (NAL Call No.: DNAL 100 M58R no.10).

0242

Invest in research.
WEFGA. Sulecki, J.C. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Jan 1988. v. 108 (1). p. 25-27. (NAL Call No.: DNAL 80 G85W).

0243

Irrigation systems and water management considerations.
PWHAA. Ley, T.W. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 151-162. ill. (NAL Call No.: DNAL 81 W273).

0244

Is there a future for Fuji?.
WEFGA. Stockwin, W. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Dec 1987. v. 107 (12). p. 20L, 20N. ill. (NAL Call No.: DNAL 80 G85W).

0245

'Jonagold': an apple for the 21st century.
FVRJA. Schechter, I. Proctor, J.T.A. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1989. v. 43 (1). p. 4-6. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

0246

The 'Jonathan' apple and its progeny.
FVRJA. Rom, R.C. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 34-39. Includes references. (NAL Call No.: DNAL 80 F9464).

0247

Lack of fungus killers hurts, state apple growers say.
Stowe, G. Charlotte, N.C. : Observer Co. The Charlotte observer. Aug 21, 1991. p. 1B. (NAL Call No.: DNAL A00064).

0248

Management practices at Paradise Orchards Limited.
CFRTA. Carruthers, R.R. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. 1987. v. 20. p. 19. (NAL Call No.: DNAL 93.5 D96).

0249

Managing bitter pit.
WEFGA. Tvergyak, P.J. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. May 1988. v. 108 (5). p. 20-21. ill. (NAL Call No.: DNAL 80 G85W).

0250

Managing the mature higher-density apple orchard.
Forshey, C.G. Fayetteville, Ark. : Arkansas State Horticultural Society. Proceedings of the ... annual meeting - Arkansas State Horticultural Society. 1986. (107th). p. 68-70. (NAL Call No.: DNAL SB21.A7A7).

0251

Marketing a winner.
WEFGA. Derr, D. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Sept 1988. v. 108 (9). p. 6-7. (NAL Call No.: DNAL 80 G85W).

0252

Matching the rootstocks with the system.
CFRTA. Tukey, L.D. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. Comparison of three training systems. 1987. v. 20. p. 84-90. Includes references. (NAL Call No.: DNAL 93.5 D96).

0253

Maturity standards for harvesting Bartlett pears for eastern shipment /F.W. Allen.
Allen, F. W. 1887-. Berkeley, Cal. : Agricultural Experiment Station, 1929. Cover title. 27 p. : ill. (some col.) ; 24 cm. (NAL Call No.: DNAL 100 C12S no.470).

0254

Mayhaws: trees of pomological and ornamental interest.
HJHSA. Payne, J.A. Krewer, G.W.; Fitenmiller, R.R. Alexandria, Va. : American Society for Horticultural Science. HortScience. Mar 1990. v. 25 (3). p. 246, 375. maps. Includes references. (NAL Call No.: DNAL SB1.H6).

0255

The mechanism of regulation of 'Bartlett' pear fruit and vegetative growth by irrigation withholding and regulated deficit irrigation.
JOSHB. Chalmers, D.J. Burge, G.; Jerie, P.H.; Mitchell, P.D. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1986. v. 111 (6). p. 904-907. Includes references. (NAL Call No.: DNAL 81 S012).

0256

Mixtures of Bacillus thuringiensis and pyrethroids control winter moth (Lepidoptera: Geometridae) in orchards without causing outbreaks of mites.
JEENAI. Hardman, J.M. Gaul, S.O. Lanham, Md. : Entomological Society of America. Extensive trials with mixtures of Bacillus thuringiensis var. kurstaki Berliner (Dipel wettable powder) and pyrethroids showed the efficacy of these mixtures against winter moth, Operophtera brumata (L.), and their compatibility, with integrated mite control in apple (Malus domestica Borkh.) orchards. In the mixtures, concentrations of the pyrethroids (cypermethrin, deltamethrin, fenvalerate, and permethrin) were one-tenth of the recommended orchard rates. Levels of winter moth injury to harvested fruit were as low with the mixtures of Dipel and pyrethroids as with half-rate or full-rate treatments of pyrethroids. Prebloom application of several mixtures significantly reduced fruit injury caused by mirids, mostly Atractotomus mali (Meyer) and Campylomma verbasci (Meyer), and the pale apple leafroller, Pseudexentera mali Freeman, and the obliquebanded leafroller, Choristoneura rosaceana (Harris). Counts of European red mite, Panonychus ulmi (Koch), and apple rust mite, Aculus schlechtendali (Nalepa), were lower, and populations of their principal natural enemy, Typhlodromus pyri Scheuten, were detected more frequently in plots treated with Dipel-pyrethroid mixtures than in plots treated with pyrethroids at half or full rates. Levels of leaf bronzing induced by European red mite

and apple rust mite were also less where mixtures were used. The mixture of Dipel with the emulsifiable concentrate formulation of cypermethrin was particularly, compatible with integrated mite control. Counts of European red mite and levels of leaf bronzing induced by European red mite with this mixture did not differ from the levels observed in the plots treated with Dipel alone. Journal of economic entomology. June 1990. v. 83 (3). p. 920-936. Includes references. (NAL Call No.: DNAL 421 J822).

0257

New directions in horticulture.
ARHMA. Loescher, W. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 48-53. (NAL Call No.: DNAL 81 M58).

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New Jersey apple varieties.
Hopfinger, J.A. Frecon, J.L. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. 1985. (094,rev.). 8 p. (NAL Call No.: DNAL S544.3.N5F7).

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The Northeast apple industry a joint project of Farm Credit Bank of Springfield ... /author, James N. Putnam, II.
Putnam, James N. Springfield, Mass. (P.O. Box 141, Springfield 01102) : The Bank, c1989. "June 1989.". iv, 58 p. : ill. ; 28 cm. (NAL Call No.: DNAL HD9259.A6A1156).

0260

Obtaining optimum fruit size--questions and answers.
PWHAA. Allen, D. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 118-121. (NAL Call No.: DNAL 81 W273).

0261

Of crops and crawfish: diversity sweeps the South.
AGREA. Kaplan, J.K. Washington, D.C. : The Service. Agricultural research - U.S. Department of Agriculture, Agricultural Research Service. Dec 1990. v. 38 (12). p. 24-25. (NAL Call No.: DNAL 1.98 AG84).

0262

Okanogan growers find pears profitable.
WEFGA. Stockwin, W. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Oct 1988. v. 108 (10). p. 16F. ill. (NAL Call No.: DNAL 80 G85W).

0263

Orchard floor management--research on weed control and sods.
ARHMA. Stiles, W.C. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1987. (117th). p. 28-36. (NAL Call No.: DNAL 81 M58).

0264

Orchard growth and fruiting of micropropagated apple trees.
JOSHB. Zimmerman, R.H. Miller, S.S. Alexandria, Va. : The Society. Four apple (Malus domestica Borkh.) cultivars, Northern Spy, Ozark Gold, Stayman, and Rome Beauty, were tissue cultured on their own roots (TC) or were budded on seedling, MM.106, or M.26 rootstocks. All four cultivars were planted at Beltsville, Md., and 'Ozark Gold' and 'Stayman' were planted at Kearneysville, W. Va. TC trees produced more vegetative growth than trees budded on MM.106 and M.26 at both locations, but TC trees differed little in size from those budded on seedling rootstock. Flowering was delayed on TC and seedling rootstock trees relative to those on MM.106 or M.26 rootstocks. Fruit yields in general were low but were higher for the trees on clonal rootstocks than th TC o seedling rootstock trees, especially at Beltsville. The limited vegetative growth and poor fruit yield of trees on M.26 and MM.106 at Beltsville may have been due to significant infestation by plant parasitic nematodes at this s . T trees seemed to have been less affec d b e nematodes, probably because of their greater vigor and more extensive root systems. All trees at Kearneysville were more vigorous than comparable ones at Beltsville. Journal of the American Society for Horticultural Science. Sept 1991. v. 116 (5). p. 780-785. Includes references. (NAL Call No.: DNAL 81 SO12).

0265

Our experiences with apple rootstocks and cultivars.
CFRTA. Fugger, B. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Paper presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March 1987. 1987. v. 20. p. 21-22. (NAL Call No.: DNAL 93.5 D96).

0266

Outlook for Alar: East.
WEFGA. Acuff, G. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. June 1987. v. 107 (6). p. 35-36. (NAL Call No.: DNAL 80 G85W).

0267

An overview of replant problems.
PWHAA. Stevens, R.G. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 132-142. (NAL Call No.: DNAL 81 W273).

0268

Pear production in Wisconsin.
Dana, M.N. Stang, E.J.; Mahr, D.L. Madison, Wis. : The Service. Publication - University of Wisconsin, Cooperative Extension Service. 1985. (A2072). 8 p. (NAL Call No.: DNAL S544.3.W6W53).

0269

Performance of scab resistant apple cultivars at the Smithfield Experimental Farm.
FVRJA. Warner, J. Potter, C. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1988. v. 42 (3). p. 96-102. Includes references. (NAL Call No.: DNAL 80 F9464).

0270

Plant bioregulators in apple and pear culture.
Miller, S.S. Portland, Or. : Timber Press. Horticultural reviews. Literature review. 1988. v. 10. p. 309-401. Includes references. (NAL Call No.: DNAL SB317.5.H6).

0271

Plant growth regulators.
MUCBA. Hull, J. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Dec 1986. (E-154). p. 12-16. (NAL Call No.: DNAL 275.29 M58B).

0272

Postharvest responses of 'Spartan' apples to preharvest paclobutrazol treatment.
HJHSA. Wang, C.Y. Steffens, G.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1987. v. 22 (2). p. 276-278. Includes references. (NAL Call No.: DNAL SB1.H6).

0273

Preharvest and postharvest handling of apples for long storage potential.
NEMFA. Bramlage, W.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 86-91. (NAL Call No.: DNAL 81 M384).

0274

Production and marketing options for New Hampshire apple growers.
Manalo, A.B. Lord, W.G. Durham, N.H. : The Station. Research report - New Hampshire Agricultural Experiment Station. Apr 1990. (123). 7 p. Includes references. (NAL Call No.: DNAL S89.E2).

0275

Production keys to a successful orchard business.
NEMFA. Lord, W.G. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held at the Sheraton Sturbridge Resort and Conference Center on January 30 and 31, 1991. 1991. (97th). p. 40-42. (NAL Call No.: DNAL 81 M384).

0276

The protection of pome fruits, 1979--March 1985 citations from Agricola concerning diseases and other environmental considerations /compiled and edited by Charles N. Bebee. --.
Bebee, Charles N. Beltsville, Md. : U.S. Dept. of Agriculture, National Agricultural Library ; Washington, D.C. : U.S. Environmental Protection Agency, Office of Pesticide Programs, 1985. "August 1985."~ Includes index. 204 p. ; 28 cm. --. (NAL Call No.: DNAL aZ5076.A1U54 no.41).

0277

Quality and storage of 'Granny Smith' and 'Greenspur' apples on seedling, M.26, and MM.111 rootstocks.
JOSHB. Drake, S.R. Larsen, F.E.; Higgins, S.S. Alexandria, Va. : The Society. Influences of rootstocks on the quality of 'Granny Smith' and 'Greenspur' apples (Malus domestica Borkh.) were evaluated over an extended harvest period and after cold storage. Apples from trees on M.26 rootstock had the higher firmness, soluble solids concentration (SSC), and Ca content, but poorer external color (red blush) and a higher percentage of solar injury than fruit from trees on seedling or MM.111 rootstocks. External greenness was best on apples from MM.111 rootstock. 'Granny Smith' apples had higher firmness, soluble solids, acids, and

carbohydrate contents, and less scald but poorer external greenness than 'Greenspur' apples. 'Granny Smith' or 'Greenspur' apples from M.26 rootstock appeared to mature earlier than those on MM.111. Journal of the American Society for Horticultural Science. Mar 1991. v. 116 (2). p. 261-264. Includes references. (NAL Call No.: DNAL 81 SO12).

0278

Quality of apple fruit from a high density orchard as influenced by rootstocks, fertilizers, maturity, and storage.
JOSHB. Fallahi, E. Richardson, D.G.; Westwood, M.N. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. 1985. v. 110 (1). p. 71-74. Includes references. (NAL Call No.: DNAL 81 SO12).

0279

Quality of prepackaged McIntosh apples in New York City retail stores / by M.J. Ceponis, J. Kaufman, and S.M. Ringel .
Ceponis, M. J. 1916-. Kaufman, Jacob,_1907-; Ringel, S. M._1924-. Washington, D.C. : U.S. Dept. of Agriculture, Agricultural Marketing Service, Market Quality Research Division, 1962 . Cover title. 12 p. ; 26 cm. (NAL Call No.: DNAL A280.39 M34Am no.461).

0280

Rapid production methods for Ottawa-3 rootstock and branched apple nursery stock.
HJHSA. Hogue, E.J. Neilsen, D. Alexandria, Va. : American Society for Horticultural Science. A system for the rapid production of Ottawa-3 (O.3) rootstock (Malus domestica Borkh.) and branched apple nursery stock in the greenhouse is described. The time required for production of a finished tree, approximately 1 year, compared favorably with traditional methods. Cuttings derived from tissue-cultured O.3 rootstocks rooted well (up to 94% success rate), and the rooting effect persisted in cuttings from tissue-cultured rootstocks grown for 1 year in the field. All combinations of two levels of N and P in a Long Ashton nutrient solution were applied weekly to pots containing either tissue-cultured rootstocks or cuttings. The growth rate of tissue-cultured rootstocks exceeded that of cuttings. The growth rate of both sources of rootstocks increased in response to added P and N. Growth of scion shoots ('Royal Gala') increased in response to N. Branch production of 'Royal Gala' was greater for trees with the higher P and N rates. Trees on tissue-cultured rootstocks had more branches than those on cutting-derived rootstocks at the higher level of N. HortScience. Nov 1991. v. 26 (11). p. 1416-1419. Includes references. (NAL Call No.: DNAL SB1.H6).

0281

Reduced rates and multiple sprays of paclobutrazol control growth and improve fruit quality of 'Delicious' apples.
JOSHB. Greene, D.W. Alexandria, Va. : The Society. 'Gardiner Delicious'/MM.106 apple (Malus domestica Borkh.) trees were initially sprayed in 1985 with paclobutrazol (PB) at 250 mg.liter-1 at tight cluster and again on 10 and 25 June and 29 July. From 1986 through 1988, PB sprays of 85 or 100 mg.liter-1 were applied at either petal fall (PF) + 2 or PF + 4 weeks and one to two additional sprays were applied per year when growth resumed. Promalin was applied to one group of trees that received PB starting at PF + 2 weeks. PB reduced terminal, lateral, and total shoot growth the year of application and in subsequent years. Although average shoot length of lateral and terminal shoots was reduced, the greatest reduction in growth occurred because PB prevented spurs from growing into lateral and terminal shoots. Compared to unsprayed trees, PB reduced pruning time in all 4 years by 23% to 70%. PB increased bloom only the first year after application, but increased fruit set for 2 years due to a carryover effect. Application of PB in 1985 caused a reduction in fruit size, sometimes in soluble solids concentration, length : diameter (L : D) ratio, and pedicel length. Promalin either overcame the reduction in the ratio or increased it in 1986. Reduced rates of PB in subsequent years caused few adverse effects on the fruit. PB increased flesh firmness when applied at PF + 2 weeks but not at PF + 4 weeks. Trees treated with PB produced fruit with higher flesh Ca and less bitter pit, cork spot, and senescent breakdown following regular air storage. Chemical names used: beta-(4-chlorophenyl)methyl-alpha-(1,1-dimethylethyl)-1H-1,2, 4-triazole-1-ethanol (paclobutrazol, PB); gibberellins A4+7 Plus N-(phenylmethyl)-1H-purine-6-amine (Promalin). Journal of the American Society for Horticultural Science. Sept 1991. v. 116 (5). p. 807-812. Includes references. (NAL Call No.: DNAL 81 SO12).

0282

Reflections on a year with reduced Alar use--a wholesaler's view.
NEMFA. Iannacci, J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 54-55. (NAL Call No.: DNAL 81 M384).

0283

Renovating mature apple trees--fruit quality through stronger spurs and better light distribution.
CFRTA. Barritt, B.H. Rom, C.R. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. 1987. v. 20. p. 70-75. ill. Includes

references. (NAL Call No.: DNAL 93.5 D96).

0284

Replant management strategies influence early growth of apple trees in a sand soil.
HJHSA. Peryea, F.J. Covey, R.P. Alexandria, Va. : American Society for Horticultural Science. HortScience. Dec 1989. v. 24 (6). p. 947-949. Includes references. (NAL Call No.: DNAL SB1.H6).

0285

Replanting old orchard soils--a panel.
PWHAA. Tvergyak, P. Stevens, B.; Slykhuis, J.; Smith, T.; Ley, T.; Barritt, B.H. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 131-169. ill. (NAL Call No.: DNAL 81 W273).

0286

Response of micropropagated apple trees to field establishment procedures.
HJHSA. Zimmerman, R.H. Alexandria, Va. : American Society for Horticultural Science. Growth, flowering, and fruiting of micropropagated 'Jonathan' apple trees (Malus domestica Borkh.) transferred in Spring 1983 to the field from either a nursery, cold storage, or greenhouse were compared. First-year shoot and trunk growth was greatest for trees transplanted from the nursery and least for trees that were held in the greenhouse before being transferred to the field. Trees pruned low (35 cm) at planting time had more terminal shoot growth and less trunk cross-sectional area after the first growing season than those pruned high (90 cm). The effect of preplanting cultural practices on vegetative growth diminished in the 2nd year and disappeared by the end of the 3rd year in the orchard. Flowering began in 1985 and was only slightly affected by preplanting cultural practices and pruning treatments. Fruiting was not affected by the treatments. HortScience. Nov 1991. v. 26 (11). p. 1364-1365. Includes references. (NAL Call No.: DNAL SB1.H6).

0287

Response of 'Top Red Delicious' apples to daminozide.
JFQUD. Drake, S.R. Baranowski, J.D.; Williams, M.W. Trumbull, Conn. : Food & Nutrition Press. Daminozide was applied at 2.2, 4.5, 6.7 or 9.0 kg/ha to 'Top Red Delicious' apple trees 86 days after full bloom the first year and at 2.2, 3.4 or 4.5 kg/ha, 80 days after full bloom the second year. At commercial harvest, after 2 and 4 months regular cold storage, and after 6 and 10 months of controlled atmosphere (CA) storage apples were evaluated for carbon dioxide, ethylene production, flesh firmness, external color, soluble solids, acids, subjective appearance and daminozide residue. Ethylene production was reduced as daminozide application was increased. Delay in onset of the climacteric ranged from 3 to 21 days depending on chemical rate used. Firmness, red color, acids, subjective appearance and number of days to reach climacteric were significantly improved by all rates of daminozide. Quality differences due to daminozide were evident following both types of storage. Daminozide residues were directly related to rate and did not dissipate during storage. There was no detectable daminozide carry-over in fruit from year to year. Journal of food quality. 1989. v. 12 (3). p. 193-202. Includes references. (NAL Call No.: DNAL TP373.5.J6).

0288

Responses of 'Bartlett' pear to withholding irrigation, regulated deficit irrigation, and tree spacing.
JOSHB. Mitchell, P.D. van de Ende, B.; Jerie, P.H.; Chalmers, D.J. Alexandria, Va. : The Society. Fruit yield was increased, summer pruning decreased, and water saved when regulated deficit irrigation (RDI) and withholding irrigation (WI) were used over 5 years to manage mature 'Bartlett' pear (Pyrus communis L.) trees planted at three levels of within-row spacing (0.5, 0.75, and 1.0 m) and trained to a Tatura trellis. Three levels of irrigation, 23%, 46%, and 92% replacement of evaporation from the planting square (Eps), were compared during the RDI period. Weight of summer prunings was positively and linearly related to level of irrigation in each year, including a relatively wet year. When compared between years, the degree of this response on the dried treatment was positively and significantly related to net evaporation (evaporation--rainfall) recorded during the period of rapid shoot growth. Fruit number also tended to be greater on the 23% and 46% Eps treatments in all years. Cumulative yield over 10 years of cropping did not differ between tree spacing, although fruit size was larger a the 1-m spacing. High yields were obtained at all levels of tree spacing. Yield and tree growth responded most to RDI for the 0.5-m-spaced trees. Journal of the American Society for Horticultural Science. Jan 1989. v. 114 (1). p. 15-19. Includes references. (NAL Call No.: DNAL 81 SO12).

0289

The role of ethylene in determining apple harvest and storage life.
Kupferman, E.M. Pullman, Wash. : Washington State University Cooperative Extension. Postharvest pomology newsletter. May 1986. v. 4 (1). p. 16-21. (NAL Call No.: DNAL TP440.P67).

0290

Root-lesion nematodes, potassium deficiency, and prior cover crops as factors in apple replant disease.
JOSHB. Merwin, I.A. Stiles, W.C. Alexandria, Va. : The Society. Growth chamber evaluations of soil from an orchard replant site showed severe stunting of 'Northern Spy' apple (Malus domestica Borkh.) seedlings grown in field soil (FS) compared with pasteurized soil (PS) from the same site. The FS : PS seedling dry weight ratio of 0.44 indicated a serious replant problem. Leaf nutrient content was generally higher in PS than FS seedlings. Multiple-regression analysis indicated that leaf K and root-lesion nematode (Pratylenchus penetrans Filipjev) primary inoculum accounted for 75% of the variation in FS seedling dry weight. Apple seedling dry weight in FS was 97% of that in PS following a marigold (Tagetes patula L. cv. Sparky) cover crop, and 75% following oats (Avena sativa L. cv. Saia). Root-lesion nematodes were nearly eliminated from the plots with marigold. Other cover crops and weed-free fallow period were less effective in controlling apple replant disease and/or phytonematodes. Journal of the American Society for Horticultural Science. Sept 1989. v. 114 (5). p. 728-732. Includes references. (NAL Call No.: ONAL 81 SO12).

0291

Rootstocks affect ripening and other qualities of 'Delicious' apples.
JOSHB. Autio, W.R. Alexandria, Va. : The Society. The effects of rootstocks on 'Delicious' (Malus domestica Borkh.) apple ripening, quality, size, mineral composition, and storability were studied over 4 years. Removal of the effects of crop load by analysis of covariance suggested that M.27 EMLA advanced fruit ripening and that M.7 EMLA delayed fruit ripening. Ott.3, M.9, MAC 9, OAR 1, M.9 EMLA, and M.26 EMLA either were inconsistent in their effects on ripening or consistently resulted in an intermediate time of ripening. Fruit size consistently was largest from trees on M.9 EMLA and smallest from trees on OAR 1. Fruit from trees on MAC 9 generally had relatively high Ca contents, and fruit from trees on OAR 1 had relatively low Ca concentrations. The effects of rootstock on storability appeared to be related to their effects on maturity and Ca levels. Journal of the American Society for Horticultural Science. May 1991. v. 116 (3). p. 378-382. Includes references. (NAL Call No.: DNAL 81 SO12).

0292

Scab-immune apple varieties for new orchards.
Stebbins, R.L. Corvallis, Or. : The Service. Extension circular EC - Oregon State University, Extension Service. Apr 1990. (1334). 5 p. (NAL Call No.: DNAL 275.29 OR32C).

0293

Skin color in 'Newtown' apples treated with calcium nitrate, urea, diphenylamine, and a film coating.
HJHSA. Meheriuk, M. Alexandria, Va. : American Society for Horticultural Science. HortScience. July 1990. v. 25 (7). p. 775-776. Includes references. (NAL Call No.: DNAL SB1.H6).

0294

Soil-borne organisms affecting replanted pears.
HJHSA. Cameron, H.R. Westwood, M.N.; Lombard, P.B. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Interactions of Soil-borne Organisms and Woody Perennial Root Systems," July 31, 1985, Blacksburg, Virginia. Dec 1986. v. 21 (6). p. 1306-1310. Includes references. (NAL Call No.: DNAL SB1.H6).

0295

Soil disinfection and monoammonium phosphate fertilization increase precocity of apples on replant problem soils.
JOSHB. Neilsen, G.H. Yorston, J. Alexandria, Va. : The Society. In an apple (Malus domestica Borkh.) orchard with a severe replant problem, tree size was increased by the 2nd year and number of fruit by the 3rd year by treating the planting hole soil with formalin or mancozeb plus monoammonium phosphate (MAP) fertilizer. Growth increases were evident each year for 4 years only for the MAP + formalin treatment. In a second orchard, with a less severe replant problem, planting-hole treatment with formalin or dazomet + MAP increased tree size by year 2. Number of fruit in year 2 was increased by formalin and mancozeb + NM treatments, although this effect persisted in year 3 only for mancozeb + MAP. Leaf P concentrations were increased to high values in the first year by NM fertilization but declined in subsequent years. Leaf Mn concentration also increased in oneorchard, a consequence of fertilizer-induced acidification of planting hole soil and Mn uptake from the fungicide mancozeb. Journal of the American Society for Horticultural Science. July 1991. v. 116 (4). p. 651-654. Includes references. (NAL Call No.: DNAL 81 SO12).

0296

Soil profile and root penetration as indicators of apple production in the lake shore district of western New York /by A.T. Sweet.
Sweet, A. T. 1869-. Washington, D.C. : U.S. Dept. of Agriculture, 1933. Caption title.~ "Contribution from Bureau of Chemistry and Soils.". 30 p. : ill., 1 map ; 23 cm. Includes bibliographical references. (NAL Call No.: DNAL 1 Ag84C no.303).

0297

Some soil quality factors in relation to replant.
PWHAA. Smith, T.J. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 146-151. ill. (NAL Call No.: DNAL 81 W273).

0298

Storage scald of apples causes and control /L.M. Ingle.
Ingle, L. Morris, 1929-. Morgantown : West Virginia University, Agricultural Experiment Station, 1966. Caption title. 9 p. ; 23 cm. (NAL Call No.: DNAL 100 W52Cu no.47).

0299

Strategic alternatives for the New York apple industry /Bruce L. Anderson.
Anderson, Bruce L. Ithaca, N.Y. : Dept. of Agricultural Economics, Cornell University Agricultural Experiment Station, New York State College of Agriculture and Life Sciences, Cornell University, 1989 . "September 1989.". 101 p. : ill. ; 28 cm. Includes bibliographical references (p. 89 -90). (NAL Call No.: DNAL 281.9 C81A no.89-15).

0300

Take your pick, it's apple time.
CSMOBF. Hanes, P. Boston, Mass. : Christian Science Pub. Society. The Christian Science monitor. Oct 3, 1990. p. 14. (NAL Call No.: DNAL A00061).

0301

Timing of mite injury affects the bloom and fruit development of apple.
JEENAI. Beers, E.H. Hull, L.A. Lanham, Md. : Entomological Society of America. The time when injury by the European red mite, Panonychus ulmi (Koch), occurs on an apple tree was studied to determine if yield components and vegetative growth were affected. Apple trees were subjected to about 1,000 cumulative mite days at three different times: early season (early May to mid-June), midseason (mid-June to 1 August), and late season (1 August to mid-October). Midseason injury resulted in the greatest reduction in mean fruit weight at harvest as well as return bloom and fruit load the following season. Late-season injury resulted in a reduction of return bloom. Early-season injury did not result in significant differences from the control for any of the response variables measured. On defruited trees, return bloom, percentage of set, and fruit load were not affected by early-season mite injury of the previous year. Percentage of set was not related to early-season injury occurring the same year. Journal of economic entomology. Apr 1990. v. 83 (2). p. 547-551. Includes references. (NAL Call No.: DNAL 421 J822).

0302

Tree renovation through light management.
PWHAA. Barritt, B.H. Rom, C.R. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1986. (82nd). p. 82, 84, 86-88. Includes references. (NAL Call No.: DNAL 81 W273).

0303

Trends of production, cultivars and planting systems on apples and pears in western Europe.
FVRJA. Winter, F. Welte, M. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 44. (NAL Call No.: DNAL 80 F9464).

0304

U.S. apple supplies other than Washington state.
PWHAA. Derr, D.I. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1988. (84th). p. 72, 74, 76, 78, 80, 82, 84-85. (NAL Call No.: DNAL 81 W273).

0305

The use of initial withholding or irrigation and tree spacing to enhance the effect of regulated deficit irrigation on pear trees.
JOSHB. Mitchell, P.D. Chalmers, D.J.; Jerie, P.H.; Burge, G. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1986. v. 111 (6). p. 858-861. Includes references. (NAL Call No.: DNAL 81 SO12).

0306

Use of lysophosphatidylethanolamine, a natural lipid, as an aid for fruit ripening and improving keeping quality.
PPGGD. Farag, K.M. Palta, J.P. Lake Alfred, Fla. : The Society. Proceedings of the Plant Growth Regulator Society of America. Meeting held August 5-9, 1990, Saint Paul, Minnesota. 1990. (17th). p. 135-137. Includes references. (NAL Call No.: DNAL SB128.P5).

0307

Varieties of apples for market / by L.H. Bailey, Jr. .
Bailey, L. H. 1858-1954. Lansing : Agricultural College of Michigan, 1887 . Cover title.~ "Department of horticulture and landscape gardening"--Cover. 6 p. ; 24 cm. (NAL Call No.: DNAL 100 M58S no.23).

0308

Variety, rootstock and orchard system considerations.
PWHAA. Barritt, B.H. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 163-169. (NAL Call No.: DNAL 81 W273).

0309

Virus tested pear germplasm available at the National Clonal Germplasm Repository in Corvallis, Oregon.
FVRJA. Postman, J. Hummer, K. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1988. v. 42 (3). p. 109-115. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

0310

Weed control in pecans, apples and peaches.
Taylor, G. Smith, M.W. Stillwater, Okla. : The Service. OSU current report - Oklahoma State University, Cooperative Extension Service. Apr 1990. (6242,rev.). 4 p. (NAL Call No.: DNAL S451.O5O8).

0311

What controls apple tree productivity?. .
NEMFA. Elfving, D.C. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held at the Sheraton Sturbridge Resort and Conference Center on January 30 and 31, 1991. 1991. (97th). p. 36-39. Includes references. (NAL Call No.: DNAL 81 M384).

0312

Where's the bloom--overcoming biennial bearing in apple trees.
PWHAA. Tvergyak, P. Agnew, K.; Williams, M. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1986. (82nd). p. 62, 64, 66, 68, 70, 72, 74, 76, 78, 80. Includes references. (NAL Call No.: DNAL 81 W273).

0313

Work together for strong apple prices.
WEFGA. Meister, R.T. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Sept 1988. v. 108 (9). p. 18-20. (NAL Call No.: DNAL 80 G85W).

0314

Yield and fruit quality of apple trees under three high density management systems.
FVRJA. Blizzard, S.H. Singha, S.; Baugher, T.A.; Cayton, B.D. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 67-72. Includes references. (NAL Call No.: DNAL 80 F9464).

0315

Yield and production efficiency of four apple cultivars in selected orchard management systems.
JDSHB. Ferree, D.C. Funt, R.C.; Bishop, B.L. Alexandria, Va. : The Society. Trees of Golden Delicious', Topred Delicious', Millersturdeespur Delicious', and Sundale Golden Delicious' apple (Malus domestica Borkh.) were grown in two or more of the following orchard management systems established in 1973: slender spindle (SS), 2151 trees/ha, Golden Delicious' and Sundale Golden Delicious'; trellis (TR), 1121 trees/ha, all cultivars; interstem hedgerow (IH), 795 trees/ha, all cultivars; and pyramid hedgerow (PH), 425 trees/ha, Golden Delicious' and Topred Delicious'. Yields of Golden Delicious' in the SS and TR were similar during the first 7 years and these systems generally produced higher yields than the less-intensive systems IH and PH) during this period. Except for a drop in yield in the TR system in year 10, Golden Delicious' trees >8 years old in all systems produced >50 t.ha-1. Topred' in the TR system outyielded IH and PH every year, while IH had higher yields than PH in three out of the eight cropping years. The spur-type cultivars Sundale and Millersturdeespur had lower yields per hectare than the standard-habit cultivars because they were spaced too widely. Yields of the systems with Sundale' generally followed plant density, with the SS being highest, IH lowest, and TR in between and often not significantly different from the other two systems. Orchard management systems had no consistent effects on fruit size. The cumulative yield per hectare of Golden Delicious' over 11 years grown as SS outproduced the IH and PH systems, with the TR yields intermediate. Sundale' managed as SS outproduced both the TR and IH systems. Topred' in the TR had higher cumulative yields per hectare than the PH system. An economic comparison of the Golden Delicious' systems indicated that PH provided the highest rate of return and the SS the lowest, with the IH and TR systems intermediate. Journal of the American Society for Horticultural Science. Nov 1989. v. 114 (6). p. 863-868. Includes

references. (NAL Call No.: DNAL 81 S012).

0316

1984 Georgia commercial apple tree survey.
GARRA. Hubbard, E.E. Purcell, J.C. Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Experiment Stations. Includes statistical data. Mar 1985. (471). 11 p. Includes 8 references. (NAL Call No.: DNAL S51.E22).

0317

1984 Georgia commercial apple tree survey.
GARRA. Hubbard, E.E. Purcell, J.C. Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Experiment Stations. Mar 1985. (471). 11 p. maps. Includes references. (NAL Call No.: DNAL S51.E22).

0318

1989 fruit spraying calendar.
MUCBA. Jones, A.L. (ed.). Howitt, A.J. (ed.); Hull, J. (ed.). East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Nov 1988. (154). 117 p. (NAL Call No.: DNAL 275.29 M58B).

0319

1990 commercial apple spray guide.
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0320

1991 Pest and orchard management guide for North Carolina apples.
Walgenbach, J.F. Sutton, T.B.; Skroch, W.A.; Unrath, C.R.; Parker, M.L.; Sullivan, W.T.; Rock, G.C. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. Jan 1991. (37). 32 p. (NAL Call No.: DNAL S544.3.N6N62).

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Fertigation of apples with nitrate or ammonium nitrogen under drip irrigation. I. Tree performance.
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0323

Abnormalities in 'Starkspur Supreme Delicious' on nine rootstocks in the 1980-81 NC-140 cooperative planting.
FVRJA. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1991. v. 45 (4). p. 213-219. Includes references. (NAL Call No.: DNAL 80 F9464).

0324

Apple and cherry pest control in Wisconsin--1988.
Mahr, D.L. Jeffers, S.N.; Binning, L.K.; Stang, E.J. Madison, Wis. : The Service. Publication - University of Wisconsin, Cooperative Extension Service. 1988. (A3314). 30 p. (NAL Call No.: DNAL S544.3.W6W53).

0325

Apple corps.
Logan, W.B. Emmaus, Pa. : Rodale Press, Inc. Organic gardening. Nov 1988. v. 31 (11). p. 44-50. ill. (NAL Call No.: DNAL S605.5.074).

0326

Apple cultivars for processing.
Way, R.D. McLellan, M.R. New York : Van Nostrand Reinhold, c1989. Processed apple products / edited by Donald L. Downing. p. 1-29. ill., maps. Includes references. (NAL Call No.: DNAL TP441.A6P76).

0327

Apple rootstock--Cepiland variety.
Masseron, A. Grillet, E. Washington, D.C. : The Office. The invention relates to a new and distinct virus-free variety of apple tree useful as a rootstock for supporting grafted apple varieties, particularly for planting of hedgerows of apple trees. The new variety originated as a clone of heat treated Paradis-Jaune-de-Metz selection, M9B, also called M9 INFEL. It has been found that there is better root lignification as well as generally several points of root issue on the clones as well as an increased vigor to the cultivars. Plant patent - United States Patent and Trademark Office. Nov 19, 1991. (7715). 4 p. plates. (NAL Call No.: DNAL 156.65 P69).

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Apple rootstock--Lancep variety.
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0329

Apple tree: Arlet.
Krapf, B. Washington, D.C. : The Office. A new vareity of apple tree has fruit with a firm flesh which is excellent for fresh eating and for use in salads. The fruit of the variety also exhibits a relatively long shelf life when compared with Golden Delicious apples and takes on a somewhat waxy or greasy appearance after extended storage. The new variety produces high and regular fruit yields and has fruit medium fruit ripening. Plant patent - United States Patent and Trademark Office. Mar 21, 1989. (6689). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0330

Apple tree 'Coop 23'.
Janick, J.W. Williams, E.B.; Emerson, F.; Korban, S.S.; Dayton, D.F.; Mehlenbacher, S.A.; Hough, L.F. Washington, D.C. : The Office. This invention relates to a new cultivar of apple tree which is characterized by resistance to apple scab and cedar apple rust, outstanding fresh fruit quality, smooth, slightly waxy skin, and a maturity approximately 7.5 to 8 weeks before 'Delicious' and 4 to 4.5 weeks before 'Prima.'. Plant patent - United States Patent and Trademark Office. Sept 6, 1988. (6268). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0331

Apples of my eye.
Page, S. Emmaus, Pa. : Rodale Press, Inc. Organic gardening. Jan 1991. v. 38 (1). p. 50-54. (NAL Call No.: DNAL S605.5.074).

0332

Arthropod resistance in plant introduction accessions of Malus sp. to some arthropod pests of economic importance.
FVRJA. Goonewardene, H.F. Povish, W.R. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1988. v. 42 (3). p. 88-91. Includes references. (NAL Call No.: DNAL 80 F9464).

0333

Arthropods in a scab, Venturia inaequalis (Cke.) Wint., (Ascomycetes: Mycosphaerellacea), and European red mite, Panonychus ulmi (Koch), (Acari: Tetranychidae), resistant apple orchard in Indiana.
FVRJA. Goonewardene, H.F. Bogyo, T.P. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 52-65. Includes references. (NAL Call No.: DNAL 80 F9464).

0334

Assembly line plants take root.
AGREA. Comis, D. Wood, M. Washington, D.C. : The Administration. Agricultural research - U.S. Department of Agriculture, Agricultural Research Service. Apr 1986. v. 34 (4). p. 6-11. ill. (NAL Call No.: DNAL 1.98 AG84).

0335

Burrknots on clonal apple rootstocks and their development as affected by scion cultivar.
CFRTA. Rom, R.C. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. 1986. v. 19. p. 183-188. Includes references. (NAL Call No.: DNAL 93.5 D96).

0336

Combining ability of apple varieties for scab resistance.
SOGEBZ. Zhdanov, V.V. Sedov, E.N. New York, N.Y. : Consultants Bureau. Soviet genetics. Translated from: Genetika, v. 24, (7), 1988, p. 1250-1255. (QH431.A1G4). Jan 1989. v. 24 (7). p. 874-878. Includes references. (NAL Call No.: DNAL QH431.A1G43).

0337

Comparison of early performance and fire blight susceptibility of 12 early season apple cultivars.
FVRJA. Ferree, D.C. Funt, R.C.; Chandler, C.K. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1988. v. 42 (1). p. 24-28. Includes references. (NAL Call No.: DNAL 80 F9464).

0338

A Computer management system for Apple ("Malus X domestica" Borkh.) germplasm with resistance to disease and arthropod pests /H.F. Goonewardene ... et al. . --.
Goonewardene, H. F. Washington, D.C.? : U.S. Dept. of Agriculture, Agricultural Research Service ; Springfield, Va. : For sale from NTIS, 1986. Caption title.~ September 1986. 26 p. : ill. ; 28 cm. --. Bibliography: p. 25. (NAL Call No.: DNAL aS21.R44A7 no.53).

0339

A computer management system for apple ("Malus X domestica" Borkh.) germplasm with resistance to diseases and arthropod pests.
Goonewardene, H.F. Rudkevich, V.; Grosso, R.; Williams, E.B. Beltsville, Md. : The Service. ARS - U.S. Department of Agriculture, Agricultural Research Service. Sept 1986. (53). 26 p. Includes references. (NAL Call No.: DNAL aS21.R44A7).

0340

Control of arthropods on apple, Malus X domestica (Borkh.), selections for scab (Ascomycetes: Mycosphaerellacea) and apple maggot (Diptera: Tephritidae) resistance in an orchard in Indiana.
JEENAI. Goonewardene, H.F. Pliego, G.; McCabe, G.P.; Howard, P.H.; Oliver, P.J. Lanham, Md. : Entomological Society of America. Three years of sampling an apple orchard with seven selections resistant to apple scab, Venturia inaequalis (Cke.) Wint., five of which were also resistant to apple maggot, Rhagoletis pomonella (Walsh), growing on three different rootstocks (EMVII, MM1106, and MM111), indicated a faunal composition consisting of eight orders from which 31 taxa in 21 families were identified. Among the 14 most frequently found groups in descending frequency were aphids, Aphis pomi De Geer and Dysaphis plantaginea Passerini; leafminer, Phyllonorycter blancardella (F.); plum curculio, Conotrachelus nenuphar (Herbst); codling moth, Cydia pomonella (L.); ants, Lasius neoniger (Emery) and Prenolepis imparis (Say); leafhoppers, Empoasca maligna Walsh, Jikradia olitoria (Say), Penthimia americana (Fitch), Scaphytopius sp., and Typhlocyba pomaria McAtee; tarnished plant bug, Lygus lineolaris (Palisot de Beauvois); green fruitworm, Lithophane antennata (Walker); flea beetle genera (unidentified); ladybird beetles, Adalia bipunctata (L.), Anatis sp., Brachiacantha ursina (F.), Coleomegilla maculata lengi Timberlake, Hippodamia convergens Guerin-Meneville, Myzia pullata (Say), and Olla v. nigrum Mulsant; apple maggot, Rhagoletis pomonella (Walsh); redbanded leafroller, Argyrotaenia velutinana (Walker); lacewing, Chrysopa carnea (Stevens); and green stink bug, Acrosternum hilare (Say). Direct inverse relationships were found between numbers of identified pests and predators. Significant differences in the incidence of arthropods were found among rootstocks and among selections. Based on these findings, we used a modified program of insecticides only (azinphosmethyl and carbaryl and fenvalerate and phosmet with water as the control applied 9, 36, and 81 d after full bloom), and obtained greater than or equal to 80% fruit without any, arthropod damage. The total crop was evaluated from fruit set to harvest. The cost of chemicals per hectare for the azinphosmethyl

and carbaryl program was $83.40;. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1426-1436. Includes references. (NAL Call No.: DNAL 421 J822).

0341

Control of arthropods on apple selections with scab (Ascomycetes: Mycophaerellacea) and European red mite (Acari: Tetranychidae) resistance.
JEENAI. Goonewardene, H.F. Pliego, G.; McCabe, G.P.; Howard, P.H.; Oliver, P.J. Lanham, Md. : Entomological Society of America. Use of pest and disease resistant cultivars in pest management is an alternative to commercial apple production that depends on use of chemical pesticides. Over a 3-yr period, we produced fruit that were 86% free of damage by key pests using selections with apple scab, Venturia inaequalis (Cke.) Wint, and European red mite, Panonychus ulmi (Koch) resistance and three critically timed sprays of either fenvalerate or phosmet. Although we did not use one, a fungicide may be needed to produce fruit that would grade well if summer diseases, Gloedes pomogena (Schw.) Colby and Leptothyrium pomi (Mont. & Fr.) Sacc. are a problem. The management program for these resistant selections produced a crop of undamaged fruit comparable with one that would be produced with a calendar-based spray program on commercially grown cultivars susceptible to pests and diseases. The cost of a program including eight sprays of insecticides, fungicides, and acaricides recommended in Indiana for apple production is $1,387.48 per season per hectare for cultivars not resistant to pests. This cost was reduced to $84.90 with phosmet or $240.00 per hectare with fenvalerate for the season when resistant selections were used. Summer disease control was not considered in our investigation but, if needed, two sprays of fungicide would cost $77.40 per season per hectare. Fruit damage related to rootstock or selection differences (or both) previously reported were not found, suggesting perhaps a masking of such effects by pesticide. Journal of economic entomology. Feb 1990. v. 83 (1). p. 180-188. Includes references. (NAL Call No.: DNAL 421 J822).

0342

Crabapple cultivar preferences of the plum curculio, Conotrachelus nenuphar (Herbst) (Coleoptera: Curculionidae).
FVRJA. Alm, S.R. Hall, F.R. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1986. v. 40 (3). p. 83-87. Includes 6 references. (NAL Call No.: DNAL 80 F9464).

0343

Crabapple tree named Amberina.
Fiala, J.L. Washington, D.C. : The Office. An ornamental flowering crabapple tree named Amberina, having disease resistant deep green leaves that change to bright gold in autumn. The cultivar produces firm, glossy, small bright red berries that maintain themselves on the tree for the entire winter. Rose-pink buds open to pure white fragrant blossoms. The cultivar roots easily as a soft wood cutting. Plant patent - United States Patent and Trademark Office. July 25, 1989. (6942). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0344

Crabapple tree named Red Peacock.
Fiala, J.L. Washington, D.C. : The Office. An ornamental flowering crabapple tree named Red Peacock, having large coral buds opening to soft pink and white ruffled blossoms, mint green disease free foliage, abundant annual blossoms and shiny red berries, early uprightness tending toward maturity into a semiweeping habit, tannish gold bark and stems, and fruit maintenance into early winter. Plant patent - United States Patent and Trademark Office. Sept 12, 1989. (7022). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0345

Crabapple tree named Red Swan.
Fiala, J.L. Washington, D.C. : The Office. An ornamental flowering crabapple tree named Red Swan, having a graceful and small weeping form to 10 feet in maturity, with heavily textured, disease resistant lanceolate leaves. The leaves change in fall to a gold color. Bright red fruit is borne abundantly. The flower buds and blossoms are pendulous, and the initially coral pink buds change to pure white before the blossoms open. Plant patent - United States Patent and Trademark Office. Aug 8, 1989. (6974). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0346

Crabapple tree named Satin Cloud.
Fiala, J.L. Washington, D.C. : The Office. An ornamental tetraploid flowering crabapple tree named Satin Cloud, having a ball-shaped, wide compact yellow billowy and rounded habit. Dark rose buds open to cinnamon fragrant satiny white blossoms with occasional pink tinging. Its waxy spring leaves are green with amber blushes, and the summer-long, disease resistant foliage is leathery and dark green. This low maintenance, closely internoded cultivar displays as autumn leaf color of burnt red, with gold leaves in the center shade part of the canopy. Plant patent - United States Patent and Trademark Office. Aug 1, 1989. (6956). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0347

Crabapples--a selection guide.
MUCBA. Peterson, C. Heatley, R. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Apr 1989. (2177). 8 p. ill. (NAL Call No.: DNAL 275.29 M58B).

0348

Damage threshold for pear psylla nymphs (Homoptera: Psyllidae).
JEENAI. Burts, E.C. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1988. v. 81 (2). p. 599-601. Includes references. (NAL Call No.: DNAL 421 J822).

0349

Damage to apple cultivars by races of European corn borer (Lepidoptera: Pyralidae).
JEENAI. Straub, R.W. Weires, R.W.; Eckenrode, C.J. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1986. v. 79 (2). p. 359-363. Includes references. (NAL Call No.: DNAL 421 J822).

0350

Differential susceptibility of Malus spp. cultivars Robusta 5, Novole, and Ottawa 523 to Erwinia amylovora.
PLDRA. Norelli, J.L. Aldwinkle, H.S.; Beer, S.V. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1986. v. 70 (11). p. 1017-1019. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0351

Effect of low temperatures on three embryonic stages of the codling moth (Lepidoptera: Tortricidae).
JEENAI. Moffitt, H.R. Burditt, A.K. Jr. Lanham, Md. : Entomological Society of America. Based on mortality, the order of tolerance of three embryonic stages of codling moth, Cydia pomonella (L.), eggs for temperatures near 0 degrees C was red ring white blackhead. Red ring stage eggs were 1.5 times more tolerant of low temperature than were white stage eggs egg 2.5 times more tolerant than blackhead stage eggs. Thirty-six, to 42 d exposure was required for complete mortality on mature Red Delicious' or Golden Delicious' apples. Tolerance of low temperature was not affected by the apple variety used as the substrate for oviposition. Eggs deposited on a substrate other than apples, such an plastic film, were significantly more susceptible to the effects of low temperature. Exposure to low temperatures such as those commonly used for short- or long-term fruit storage shows promise as an alternative to fumigation as a treatment for codling moth eggs on apples and pears after harvest. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1379-1381. Includes references. (NAL Call No.: DNAL 421 J822).

0352

'Elliot' pear.
HJHSA. Ryugo, K. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1989. v. 24 (5). p. 869-870. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

0353

Evaluating spray materials to control fire blight: laboratory, greenhouse, and field techniques.
Beer, S.V. Norelli, J.L. St. Paul, Minn. : APS Press, c1986. Methods for evaluating pesticides for control of plant pathogens / edited by Kenneth D. Hickey ; prepared jointly by the American Phytopathological Society and the Society of Nematologists. p. 134-142. Includes references. (NAL Call No.: DNAL SB960.M47 1986).

0354

Evaluation of a methyl bromide quarantine treatment to control codling moth (Lepidoptera: Tortricidae) on nectarine cultivars proposed for export to Japan.
JEENAI. Yokoyama, V.Y. Miller, G.T.; Hartsell, P.L. Lanham, Md. : Entomological Society of America. Our experiments showed that testing required by regulatory agencies to demonstrate the efficacy of a quarantine treatment using 48 g/m3 methyl bromide for 2 h at 21 degrees C or above and 50% load was unnecessary to control codling moth, Cydia pomonella (L.), on every nectarine cultivar proposed for export to Japan. Ovipositional tests for codling moth on nine nectarine cultivars showed no differences in acceptability among cultivars that might cause higher populations in harvested fruit and affect quarantine security levels. Measurements of egg chorion and fruit cuticle showed that codling moth eggs were not affected by different nectarine cultivars and other fruit substrates. No differences that would reduce the efficacy of the methyl bromide quarantine treatment were found in codling moth mortality to methyl bromide fumigation in dose-response tests on different substrates, including nectarine, peach, plum, and apple cultivars and waxed paper. A confirmatory test resulted in 100% mortality of 27,174 1-d-old codling moth eggs. The true survival proportion based on all confirmatory tests was less than or equal to 20 per 1 million at the 95% CL. A concentration X time product of (average +/- SD) 68.0 +/- 3.0 g.h/m3 methyl bromide was considered a useful measurement to help maintain treatment security for control of codling moth on all nectarine cultivars. Journal of economic entomology. Apr 1990. v. 83 (2). p. 466-471. Includes references. (NAL Call No.: DNAL 421 J822).

0355

Evaluation of flowering crabapple susceptibility to apple scab in Ohio--1988.
ORDCB. Smith, E.M. Treaster, S.A. Wooster, Ohio : The Center. Special circular - Ohio Agricultural Research and Development Center. In the series analytic: Ornamental plants: a summary of research, 1989. Jan 1989. (123). p. 9-13. Includes references. (NAL Call No.: DNAL 100 OH3S).

0356

Evaluation of flowering crabapple susceptibility to apple scab in Ohio--1990.
ORDCB. Smith, E.M. Treaster, S.A. Wooster, Ohio : The Center. Special circular - Ohio Agricultural Research and Development Center. Jan 1991. (137). p. 10-15. Includes references. (NAL Call No.: DNAL 100 OH3S).

0357

Evaluation of ripening and fruit quality of 'Gala' and 'McIntosh' apples at harvest and following air storage.
FVRJA. Greene, D.W. Autio, W.R. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1990. v. 44 (3). p. 117-123. Includes references. (NAL Call No.: DNAL 80 F9464).

0358

E11-24, E14-32, and E36-7 apple germplasm with multiple pest resistance.
HJHSA. Goonewardene, H.F. Alexandria, Va. : American Society for Horticultural Science. HortScience. Dec 1987. v. 22 (6). p. 1346-1348. Includes references. (NAL Call No.: DNAL SB1.H6).

0359

E7-47, E7-54, E29-56, and E31-10 apple germplasm with multiple pest resistance.
HJHSA. Goonewardene, H.F. Howard, P.H. Alexandria, Va. : American Society for Horticultural Science. HortScience. Feb 1989. v. 24 (1). p. 167-169. Includes references. (NAL Call No.: DNAL SB1.H6).

0360

Feeding behavior of pear psylla (Homoptera: Psyllidae) nymphs on susceptible and resistant Pyrus germplasm.
JEENAI. Butt, B.A. Stuart, L.C.; Bell, R.L. College Park, Md. : Entomological Society of America. In laboratory studies, pear psylla, Cacopsylla pyricola (Foerster), readily fed on 'Bartlett, 'Seckel,' and 'Monterrey' pear (Pyrus spp.).On known psylla-resistant genotypes, 'NY10352,' 'NY10355,' and 'Bradford,' psylla probed frequently and moved about, but either left the plant or died after little feeding. Results of these behavioral studies indicate that susceptible and resistant genotypes can be readily distinguished in a 24-h bioassay. Journal of economic entomology. Oct 1988. v. 81 (5) p. 1394-1397. Includes references. (NAL Call No.: DNAL 421 J822).

0361

Feeding, longevity, and development of pear psylla (Homoptera: Psyllidae) nymphs on resistant and susceptible pear genotypes.
JEENAI. Butt, B.A Stuart, L.C.; Bell, R.L. Lanham, Md. : Entomological Society of America. One-day-old first-instar pear psylla, Cacopsylla pyricola Foerster, were placed on 'Bartlett' (susceptible), NY10352 (moderately resistant), and 'Bradford' (resistant) pear (Pyrus spp.) genotypes. Psylla nymphs fed and developed readily on 'Bartlett' but fed little, developed slowly, and did not reach the fifth stadium on 'Bradford.' Psylla feeding on NY10352 resulted in an extremely extended development time, with very few reaching the adult stage. Journal of economic entomology. Apr 1989. v. 82 (2). p. 458-461. Includes references. (NAL Call No.: DNAL 421 J822).

0362

Field performance of Malus sargentii as a rootstock for four commercial apple varieties.
FVRJA. Olien, W.C. Stiles, W.C.; McCrum, R.C. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1986. v. 40 (4). p. 140-143. Includes references. (NAL Call No.: DNAL 80 F9464).

0363

Field susceptibility of scab-resistant apple cultivars and selections to cedar apple rust, quince rust and hawthorn rust.
FVRJA. Warner, J. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1990. v. 44 (4). p. 216-225. Includes references. (NAL Call No.: DNAL 80 F9464).

0364

Field susceptibility of 68 apple cultivars to cedar apple rust, quince rust and hawthorn rust.
FVRJA. Warner, J. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1992. v. 46 (1). p. 6-10. Includes references. (NAL Call No.: DNAL 80 F9464).

0365

Fire blight resistance of several wild pear seedlings collected in southwestern Ontario.
FVRJA. Quamme, H.A. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1986. v. 40 (2). p. 59-61. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

0366

Fire blight susceptibility of apple introductions and selections.
FVRJA. Mehlenbacher, S.A. Varney, E.H. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1987. v. 41 (1). p. 19-22. Includes references. (NAL Call No.: DNAL 80 F9464).

0367

Flowering crab apple tree.
Fiala, J.L. Washington, D.C. : The Office. A new variety of crab apple tree, which I call "Doubloons", has large white double flowers, a generally round habit of growth with upright spreading dense branches and yellow fruit. The new variety is resistant to apple scab. Plant patent - United States Patent and Trademark Office. Apr 10, 1990. (7216). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0368

Flowering crab apple tree 'Sinai Fire'.
Fiala, J.L. Washington, D.C. : The Office. A new variety of crab apple tree, which I call 'Sinai Fire', has white flowers, weeping branches and red fruit. The new variety is resistant to apple scab. Plant patent - United States Patent and Trademark Office. Apr 9, 1991. (7492). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0369

'Freedom': a disease-resistant apple.
HJHSA. Lamb, R.C. Aldwinckle, H.S.; Terry, D.E. Alexandria, Va. : American Society for Horticultural Science. HortScience. Aug 1985. v. 20 (4). p. 774-775. ill. Includes 3 references. (NAL Call No.: DNAL SB1.H6).

0370

Gala, a new early-maturing apple variety.
Stebbins, R.L. Corvallis, Or. : The Service. PNW bulletin - Pacific Northwest Extension Publication, Washington, Oregon, and Idaho State Universities, Cooperative Extension Service. July 1987. (319). 4 p. ill. (NAL Call No.: DNAL 275.29 W27PN).

0371

Genetics and linkage analysis of 19 isozyme loci in apple.
JOSHB. Weeden, N.F. Lamb, R.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Sept 1987. v. 112 (5). p. 865-872. ill. Includes references. (NAL Call No.: DNAL 81 SD12).

0372

Growing pears in North Carolina.
Williams, K.M. Werner, D.J. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. June 1987. (80,rev.). 13 p. ill. Includes references. (NAL Call No.: DNAL S544.3.N6N62).

0373

Growth regulators and herbicides for delaying apple fruit abscission.
HJHSA. Marini, R.P. Byers, R.E.; Sowers, D.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Dec 1989. v. 24 (6). p. 957-959. Includes references. (NAL Call No.: DNAL SB1.H6).

0374

Homology of the agent associated with dapple apple disease to apple scar skin viroid and molecular detection of these viroids.
PHYTA. Hadidi, A. Huang, C.; Hammond, R.W.; Hashimoto, J. St. Paul, Minn. : American Phytopathological Society. Gel electrophoresis coupled with molecular hybridization analyses using 32P-labeled SP6-generated apple scar skin viroid (ASSV)-specific cRNA probes demonstrated that the pathogen associated with dapple apple disease is a viroid that is closely homologous to ASSV. Dapple apple viroid (DAV) consists of fewer than 359 nucleotides and is systemically distributed in apple seed, fruit, bark, leaf, and root tissues of infected apple trees. Molecular hybridization assays using 32P-labeled ASSV cRNA probes have been developed and applied for the detection of DAV or ASSV in small amounts of infected apple tissue (0.2-2.0 g). These assays are accurate, easy to perform, and applicable for screening DAV or ASSV in imported apple cultivars. These viroids now can be positively identified from infected apple tissue in a few days instead of a few years by fruit symptoms on grafted woody indicators. Phytopathology. Mar 1990. v. 80 (3). p. 263-268. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

0375

Horticultural alternatives.
ILLRA. Korban, S.S. Urbana, Ill. : The Station. Illinois research - Illinois Agricultural Experiment Station. Fall/Winter 1989. v. 31 (3/4). p. 32. (NAL Call No.: DNAL 100 IL64).

0376

In vitro reaction between apple pollen and apple scab fungus (Venturia inaequalis Cke. Wint.).
Visser, T. Meys, Q. van der. New York : Springer-Verlag, c1986. Biotechnology and ecology of pollen : proceedings, International Conference on Biotechnology and Ecology of Pollen, 9-11 July 1985, Univ. of Massachusetts, Amherst, MA / ed. by D.L. Mulcahy, G.B. Mulcahy and E. Ottaviano. p. 119-124. Includes references. (NAL Call No.: DNAL QK658.B575).

0377

In vitro testing of the reaction of apple rootstocks to Phytophthora cactorum.
FVRJA. Barritt, B.H. Covey, R.P.; Dilley, M.A. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1990. v. 44 (1). p. 23-25. Includes references. (NAL Call No.: DNAL 80 F9464).

0378

Inheritance of resistance to fire blight in Malus crosses.
Korban, S.S. Ries, S.M.; Morrisey, J.F.; Hattermann, D. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1988. v. 6 (1). p. 22-24. Includes references. (NAL Call No.: DNAL SB1.J66).

0379

Japanese pear tree.
Kanato, K. Machida, Y.; Kozaki, I.; Chiba, T.; Kishimoto, O.; Seike, K.; Shimura, I.; Kotobuji, K.; Omura, M.; Kajiura, I. Washington, D.C. : The Office. Disclosed herein is a Japanese pear tree which has a moderate vigor and an easily maintained moderate spur development, is resistant to black spot disease, and as productive as 'Hosui'. The tree is cross-incompatible with 'Kosui' and is assumed to have an S4S5 genotype, and has brown young leaves and white large flowers which have a pale red color at the pit at fat bud and bloom middle to late in the season and at almost the same time as 'Nijisseiki'. The tree can produce an oblate-shaped fruit which matures early in the season, earlier than 'Nijisseiki', and has a normal keeping quality. The fruit has a large size which is larger than that of 'Nijisseiki', a skin which is covered partly with russet when cultivated without bagging is at early maturity of the yellowish green color identified in the Munsel. Book of Color as follows: Hue symbol: 2.5 gy, Chroma: 6, Value: 9, and is at full maturity of the yellow color identified in the Munsel Book of Color as follows: Hue symbol: 10 y, Chroma: 6, Value: 9, and a white flesh which is soft, crisp and very juicy, with a high sweetness, a lower acidity, no astringency, and a slight aromatic flavor, giving an excellent dessert quality. Plant patent - United States Patent and Trademark Office. Apr 11, 1989. (6726). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0380

Japanese pear tree "Chikusui".
Machida, Y. Kotobuki, K.; Kajiura, I.; Sato, Y.; Kozono, T.; Kanato, K.; Seike, K.; Shimura, I.; Omura, M.; Abe, K. Washington, D.C. : The Office. Disclosed herein is a Japanese pear tree having a moderate vigor and an easily maintained moderate spur development, a high resistance to black spot disease and a high productivity. This tree produces an oblate-shaped fruit which matures early in the season, i.e., from the start to the middle of August, in the central part of the Kanto district, Japan. The fruit has a medium size and the same weight as 'Kosui', i.e., 250 to 300 g, a yellowish brown skin, and a white flesh which is soft, crisp and very juicy with a high Brix the pH of the juice being about 5.2, a particular smell without aromatic flavor, giving an excellent dessert quality. Plant patent - United States Patent and Trademark Office. Dec 31, 1991. (7758). 3 p. plates. (NAL Call No.: DNAL 156.65 P69).

0381

The 'Jonathan' apple and its progeny.
FVRJA. Rom, R.C. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 34-39. Includes references. (NAL Call No.: DNAL 80 F9464).

0382

Leaf Scorch Responses of 'Sensation' and 'Bartlett' Pear to twopspotted spider mite (Acari: Tetranychidae).
JEENAI. McNab, S.C. Jerie, P.H. Lanham, Md. : Entomological Society of America. The effect of 0, 2, 5, and 10 adult female twospotted spider mites, Tetranychus urticae Koch, per leaf on the percentage of leaf area affected by leaf scorch and leaf stippling was investigated in two pear cultivars, 'Bartlett' ('William Bon Chretien') and 'Sensation', a red 'Bartlett' mutation. The percentage of leaf area affected by stippling increased ($P < 0.001$) with increasing mite density on both varieties. There was no significant ($P > 0.05$) difference in the leaf-stippling response of the two cultivars. The percentage of leaf area affected by scorch was found to significantly increase

($P < 0.01$) on 'Bartlett' leaves with increasing mite density; virtually no leaf scorch was observed on 'Sensation' leaves. Mite densities were similar at each treatment level for 'Bartlett' and 'Sensation' leaves. This indicates a tolerance to leaf scorch resulting from twospotted spider mite feeding in the 'Sensation' variety. Journal of economic entomology. Aug 1991. v. 84 (4). p. 1334-1338. Includes references. (NAL Call No.: DNAL 421 J822).

0383

Lessons from the Red Delicious success story.
PWHAA. O'Rourke, A.D. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1989. (85th). p. 103. (NAL Call No.: DNAL 81 W273).

0384

Malus Coral Cascade.
Ross, H.A. Washington, D.C. : The Office. Named for its graceful, semi-weeping habit and persistant coral-orange fruit, Malus cultivar 'Coral Cascade' offers a unique fall display among crabapple cultivars with a weeping habit. The abundant load of large pea-sized ornamental fruit causes its slender horizontal branches to droop in a cascade of reddish-orange color. Its annual fruit production results in a permanent downward arching of the branches as the plant ages. This crabapples small stature (15' tall X 20' wide in 30 years) makes it desirable for use in prominant landscape locations, elevated planters, and beneath power lines. The spring flower display starts with pinkish-red buds on pendulous pedicels of about 1.5" (4 cm) in length. The abundant flowers open white with the abaxial edges of the petals remaining pink. 'Coral Cascade' has an established record of disease resistance. Its thick, green leaves retain their high quality until fall frosts trasform them to golden hues of yellow, orange and tan. Plant patent - United States Patent and Trademark Office. Feb 6, 1990. (7142). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0385

Malus hupehensis named 'Cardinal'.
Flemer, W. III. Washington, D.C. : The Office. A Malus hupehensis tree providing abundant red flowers and small, very glossy red fruits, having resistance to defoliation in hot humid summers and to leaf injury from apple scab fungus or mildew which severely affects other similar trees in an adjacent area, the tree growing rapidly and displaying a wide spreading crown. Plant patent - United States Patent and Trademark Office. Feb 13, 1990. (7147). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0386

'McShay' apple.
HJHSA. Mehlenbacher, S.A. Thompson, M.M.; Janick, J.; Williams, E.B.; Emerson, F.H.; Korban, S.S.; Dayton, D.F.; Hough, L.F. Alexandria, Va. : American Society for Horticultural Science. HortScience. Dec 1988. v. 23 (6). p. 1091-1092. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

0387

Methods for field evaluation of fungicides for control of foliar and fruit diseases of apple.
Hickey, K.D. Yoder, K.S.; Zehr, E.I. St. Paul, Minn. : APS Press, c1986. Methods for evaluating pesticides for control of plant pathogens / edited by Kenneth D. Hickey ; prepared jointly by the American Phytopathological Society and the Society of Nematologists. p. 116-119. Includes references. (NAL Call No.: DNAL SB960.M47 1986).

0388

Monitoring the codling moth (Lepidoptera: Olethreutidae) and the obliquebanded leafroller (Lepidoptera: Tortricidae) with sticky and nonsticky traps.
JEENAI. Vincent, C. Mailloux, M.; Hagley, E.A.C.; Reissig, W.H.; Coli, W.M.; Hosmer, T.A. Lanham, Md. : Entomological Society of America. In monitoring trials conducted in 1985 in 17 apple orchards of Quebec, Ontario, Massachusetts, and New York, two sticky pheromone trap models (Pherocon 1C and Pherocon II) and two nonsticky trap models (Multi-Pher I and III) were tested to monitor the codling moth, Cydia pomonella L., and the obliquebanded leafroller, Choristoneura rosaceana (Harris). Three criteria of trap performance were considered: 1) total seasonal captures, (2) maximum seasonal captures of the first generation, and (3) first date of captures. Trap performance varied between sprayed and unsprayed orchards. In sprayed orchards, Pherocon 1C and Multi-Pher I had higher codling moth captures than expected; however, no trap model was consistently superior for monitoring of obliquebanded leafroller. For codling moth, Multi-Pher I consistently had a higher frequency of maximum seasonal captures than other trap models. For the obliquebanded leafroller, the two sticky trap models had a higher frequency of maximum captures than other trap models in sprayed orchards. Pherocon II was the best trap for evaluation of the first date of capture of codling moth in sprayed and unsprayed orchards and obliquebanded leafroller in sprayed orchards. Journal of economic entomology. Apr 1990. v. 83 (2). p. 434-440. Includes references. (NAL Call No.: DNAL 421 J822).

0389

The new generation of disease resistant apples.
NEMFA. Lamb, R.C. Livermore, K.G. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 102-106. (NAL Call No.: DNAL 81 M384).

0390

New Jersey apple varieties.
Hopfinger, J.A. Frecon, J.L. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. 1985. (094,rev.). 8 p. (NAL Call No.: DNAL S544.3.N5F7).

0391

Our experiences with apple rootstocks and cultivars.
CFRTA. Fugger, B. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Paper presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March 1987. 1987. v. 20. p. 21-22. (NAL Call No.: DNAL 93.5 D96).

0392

Pear tree--'Elliot'.
Ryugo, K. Washington, D.C. : The Office. A new and distinct variety of pear tree primarily characterized by its tolerance to the fire-blight organism. (Erwinia amylovora), and further characterized by a blooming habit concurrent with 'Bartlett'; skin with firm and buttery texture, and fruit with a flavor which is excellent to good. The keeping quality of the fruit is good to excellent. Plant patent - United States Patent and Trademark Office. Dec 6, 1988. (6452). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0393

Pear tree--Red Winter.
Zanzi, G. Washington, D.C. : The Office. A new and distinct asexually reproduced pear tree called Red Winter, as illustrated and described. The fruit is large, light yellow-red in color and has a very sweet flavor. It ripens approximately thirty-five days after the William Barlett variety and has an exceptionally long shelf life under the conditions existing in the Ferrara region of Northern Italy. Plant patent - United States Patent and Trademark Office. July 4, 1989. (6897). 1 p. plates. (NAL Call No.: DNAL 156.65 P69).

0394

Pear tree Old Home X Farmingdale variety No. 87.
Brooks, L.A. Washington, D.C. : The Office. This invention relates to a new and distinct variety of pear tree which is useful as a size-controlling rootstock. The new variety originated as a single seedling selected from a large group of pear seedlings which were grown from open-pollinated seed. This seed was collected from Old Home Pear Trees (Pyrus communis) growing in an isolated planting with Farmingdale pollinizers. Pear fruiting varieties propagated on the under stock of this new rootstock variety are approximately 80% of the size of like pear trees growing on domestic Bartlett seedling rootstocks. This "semi-dwarfing" selection is easily asexually reproduced; particularly by hardwood cuttings. It has proven to be graft compatible with all commercially grown pear varieties. It was selected for its non-rootsuckering habit, its resistance to Fireblight disease and its tolerance of Pear Decline disease. It has also proven to be hardy, early bearing and well anchored in the many areas and soil types where it was tested. It has proven to be adaptable to Northern pear growing areas such as Summerland, British Columbia, Harrow, Ontario, and Kentsville, Nova Scotia, Canada, having been selected to fill these Northern pear growing rootstock needs. Plant patent - United States Patent and Trademark Office. Nov 1, 1988. (6362). 3 p. plates. (NAL Call No.: DNAL 156.65 P69).

0395

Postharvest calcium treatment of apple fruit to provide broad-spectrum protection against postharvest pathogens.
PLDIDE. Conway, W.S. Sams, C.E.; Abbott, J.A.; Bruton, B.D. St. Paul, Minn. : American Phytopathological Society. Plant disease. June 1991. v. 75 (6). p. 620-622. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0396

The prickly pears (Opunita spp.): plants with economic potential.
Russell, C.E. Felker, P. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Management and Utilization of Arid Land Plants," February 18-22, 1985, Saltillo, Mexico. Sept 1986. (135). p. 41. Includes references. (NAL Call No.: DNAL aSD11.A42).

0397

Processing quality of pear selections in the Harrow breeding program.
FVRJA. Kappel, F. Quamme, H.A. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1987. v. 41 (4). p. 136-140. Includes references. (NAL Call No.: DNAL 80 F9464).

0398

Reactions of crab apples considered as potential apple pollinizers to latent virus infection.
FVRJA. Fridlund, P.R. Aichele, M.D. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1987. v. 41 (1). p. 17-18. Includes references. (NAL Call No.: DNAL 80 F9464).

0399

Regeneration and transformation experiments in apple.
NASSD. Welander, M. Maheswaran, G. New York, N.Y. : Plenum Press. NATO ASI series : Series A : Life sciences. In the series analytic: Woody plant biotechnology / edited by M.R. Ahuja. Proceedings of a Workshop at the Institute of Forest Genetics, USDA Forest Service, October 15-19, 1989, Placerville, California. 1991. v. 210. p. 237-246. ill. Includes references. (NAL Call No.: DNAL QH301.N32).

0400

Reimer cultivar pear tree.
Reimer, F. Washington, D.C. : The Office. A pear tree, which is a planned cross between Max Red Bartlett and Comice is characterized by its heavy crop of large red-skinned fruit of excellent dessert quality which long storage life. Plant patent - United States Patent and Trademark Office. Aug 9, 1988. (6245). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0401

Resistance to powdery mildew from some small-fruited Malus cultivars.
HJHSA. Gallott, J.C. Lamb, R.C.; Aldwinckle, H.S. Alexandria, Va. : American Society for Horticultural Science. HortScience. Dec 1985. v. 20 (6). p. 1085-1087. Includes references. (NAL Call No.: DNAL SB1.H6).

0402

Response of apple cultivars to fumigation with methyl bromide.
HJHSA. Meheriuk, M. Gaunce, A.P.; Dyck, V.A. Alexandria, Va. : American Society for Horticultural Science. HortScience. May 1990. v. 25 (5). p. 538-540. Includes references. (NAL Call No.: DNAL SB1.H6).

0403

'Richelieu' apple.
HJHSA. Granger, R.L. Fortin, C.N.; Rousselle, G.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1990. v. 25 (10). p. 1310-1311. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

0404

Ripening and storability of 'Marshall McIntosh' apples.
FVRJA. Autio, W.R. Bramlage, W.J.; Lord, W.J. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1990. v. 44 (1). p. 36-40. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

0405

Rootstocks affect ripening and other qualities of 'Delicious' apples.
JOSHB. Autio, W.R. Alexandria, Va. : The Society. The effects of rootstocks on 'Delicious' (Malus domestica Borkh.) apple ripening, quality, size, mineral composition, and storability were studied over 4 years. Removal of the effects of crop load by analysis of covariance suggested that M.27 EMLA advanced fruit ripening and that M.7 EMLA delayed fruit ripening. Ott.3, M.9, MAC 9, OAR 1, M.9 EMLA, and M.26 EMLA either were inconsistent in their effects on ripening or consistently resulted in an intermediate time of ripening. Fruit size consistently was largest from trees on M.9 EMLA and smallest from trees on OAR 1. Fruit from trees on MAC 9 generally had relatively high Ca contents, and fruit from trees on OAR 1 had relatively low Ca concentrations. The effects of rootstock on storability appeared to be related to their effects on maturity and Ca levels. Journal of the American Society for Horticultural Science. May 1991. v. 116 (3). p. 378-382. Includes references. (NAL Call No.: DNAL 81 SO12).

0406

Susceptibility of Malus spp. to the apple blotch leafminer (Lepidoptera: Gracillariidae).
EVETEX. Alm, S.R. Weires, R.W.; Lamb, R.C.; Nielsen, R.A.; Vankirk, J.R. College Park, Md. : Entomological Society of America. Environmental entomology. June 1985. v. 14 (3). p. 228-230. Includes references. (NAL Call No.:

DNAL QL461.E532).

0407

Susceptibility of pear cultivars to blossom blast caused by Pseudomonas syringae.
HJHSA. Whitesides, S.K. Spotts, R.A. Alexandria, Va. : American Society for Horticultural Science. Conditions were established for inducing pear (Pyrus communis L.) blossom blast caused by Pseudomonas syringae (Ps) on detached shoots. Highest incidence of infection followed occurrence of a major exotherm in the presence of Ps suspended in water drops on blossom tissue. Eight pear cultivars were evaluated for susceptibility to blossom blast, with the red-fruited 'Beurre d'Anjou' sports 'Gebhart' and 'Columbia' least susceptible and 'Doyenne du Comice', 'Beurre d'Anjou', and 'Beurre Bosc' most susceptible. HortScience. July 1991. v. 26 (7). p. 880-882. Includes references. (NAL Call No.: DNAL SB1.H6).

0408

Tolerance of three apple cultivars to ultra-low levels of oxygen.
HJHSA. Lau, O.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Nov 1990. v. 25 (11). p. 1412-1414. Includes references. (NAL Call No.: DNAL SB1.H6).

0409

Validation of injury thresholds for European red mite (Acari: Tetranychidae) on 'Yorking' and 'Delicious' apple.
JEENAI. Hull, L.A. Beers, E.H. Lanham, Md. : Entomological Society of America. Injury thresholds for the European red mite, Panonychusulmi (Koch), were validated for two major apple (Malus X domestica Borkhauser)cultivars, 'Yorking' and 'Delicious,' in Pennsylvania. Four target injury thresholds (0,250, 750, and 1,250 cumulative mite days CMD per leaf) were established on trees for 1 or 2 yr.Most of mite injury occurred during July and August. Effects of injury were determinedon mean fruit weight, soluble solids, fruit firmness, fruit color, as well as returnbloom, percentage of fruit set, and fruit load the year following injury. Only the target injurythreshold level of 1,250 CMDs caused any reduction in yield variables, and this occurred onlyduring the year after mite injury. These reductions occurred for return bloom, percentage offruit set, and return fruit load and only for the cultivar 'Yorking.' Mite injury had no effectduring current season. Adoption of an injury threshold of 750 CMDs is proposed for applesin Pennsylvania. Hypotheses are presented to help explain differences in results ofour study compared with those of previous studies. Journal of economic entomology. Oct 1990. v. 83 (5). p. 2026-2031. Includes references. (NAL Call No.: DNAL 421 J822'

0410

Virus tested pear germplasm available at the National Clonal Germplasm Repository in Corvallis, Oregon.
FVRJA. Postman, J. Hummer, K. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1988. v. 42 (3). p. 109-115. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

0411

Within-tree spatial patterns of Platynota idaeusalis (Lepidoptera: Tortricidae) on two apple cultivars.
EVETEX. Meagher, R.L. Jr. Hull, L.A. College Park, Md. : Entomological Society of America. Environmental entomology. June 1987. v. 16 (3). p. 786-790. Includes references. (NAL Call No.: DNAL QL461.E532).

0412

Development of the amorphous layer (protective layer) in xylem parenchyma of cv. Golden Delicious apple, cv. Loring peach, and willow.
AJBOAA. Schaffer, K. Wisniewski, M. Columbus, Ohio : Botanical Society of America. American journal of botany. Nov 1989. v. 76 (11). p. 1569-1582. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

0413

Effect of canopy density on pesticide deposition and distribution in apple trees.
PLDRA. Travis, J.W. Skroch, W.A.; Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1987. v. 71 (7). p. 613-615. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0414

Fine structure of apple leaves treated with the sterol-inhibiting fungicide bitertanol.
HJHSA. Overton, S.V. Moore, L.D.; Miller, O.K. Alexandria, Va. : American Society for Horticultural Science. Ultrastructural observations were made of leaves of apple (Malus domestica Borkh. cv. Red Delicious) 12, 24, and 72 hours following a single foliar application of the sterol-inhibiting fungicide bitertanol. Thylakoids of chloroplasts from treated leaves were swollen and irregular and chloroplasts had lost their integrity within 12 hours after treatment. Occasionally, mitochondria looked washed out, although no other changes in membrane or organelle structures were observed. Within 24 to 72 hours, moreover, thylakoids of chloroplasts from treated leaves returned to a state similar to that of the controls. However, the numbers of starch granules in the chloroplasts of treated leaves appeared to increase throughout the 72 hours and remained somewhat higher than levels in controls. Thus, bitertanol does not appear to have a lasting effect on apple leaves. HortScience. Feb 1991. v. 26 (2). p. 173-175. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

0415

Graft union histology and distribution of tomato ringspot virus in infected McIntosh/Malling Merton 106 apple trees.
PHYTAJ. Tuttle, M.A. Gotlieb, A.R. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Mar 1985. v. 75 (3). p. 347-351. ill. Includes 14 references. (NAL Call No.: DNAL 464.8 P56).

0416

Histology of Delicious/Malling Merton 106 trees affected by apple union necrosis and decline.
PHYTAJ. Tuttle, M.A. Gotlieb, A.R. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Mar 1985. v. 75 (3). p. 342-347. ill. Includes 18 references. (NAL Call No.: DNAL 464.8 P56).

0417

Apple orchard management in relation to quality.
NEMFA. Bramlage, W.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 64-67. (NAL Call No.: DNAL 81 M384).

0418

Apple seedling response to calcium.
JPNUDS. Han, Z.H. Baligar, V.C.; Korcak, R.F.; Shen, T. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (9). p. 1155-1166. ill. Includes references. (NAL Call No.: DNAL QK867.J67).

0419

The association of molybdenum and oxalic acid with several mineral elements involved in the development of internal bark necrosis of the apple /by Donald Richard Heinicke.
Heinicke, Donald Richard, 1931-. 1960 i.e., 1961 . Thesis - University of Maryland, College Park. Publication changed on t.p. charged to read 1961 t. 63 leaves : ill. ; 29 cm. Bibliography: leaves 61-63. (NAL Call No.: DNAL DISS 61-5,396).

0420

Comparisons of calcium chloride, calcium phosphate, and a calcium chelate as foliar sprays for 'McIntosh' apple trees.
JDSHB. Bramlage, W.J. Drake, M.; Weis, S.A. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1985. v. 110 (6). p. 786-789. Includes 22 references. (NAL Call No.: DNAL 81 SD12).

0421

Effect of a grass on growth and mycorrhization of potted apple trees.
HJHSA. Reich, L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1985. v. 20 (2). p. 265-267. ill. Includes 15 references. (NAL Call No.: DNAL SB1.H6).

0422

Effect of micronutrients, phosphorous and chelator to iron ratio on growth, chlorosis and nutrition of apple seedlings.
JPNUDS. Tong, Y.A. Fan, F.; Korcak, R.F.; Chaney, R.L.; Faust, M. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1986. v. 9 (1). p. 23-41. ill. Includes references. (NAL Call No.: DNAL QK867.J67).

0423

Effect of soil management and calcium nitrate fertilization on the availability of soil nitrate and cations in an eastern apple orchard.
JOSHB. Glenn, D.M. Miller, S.S.; Habecker, M.A. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. May 1987. v. 112 (3). p. 436-440. Includes references. (NAL Call No.: DNAL 81 SD12).

0424

Effect of urea nitrogen on fruitfulness and fruit quality of Starkspur Golden Delicious apple trees.
JPNUDS. Tami, M. Lombard, P.B.; Righetti, T.L. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1986. v. 9 (1). p. 75-85. Includes references. (NAL Call No.: DNAL QK867.J67).

0425

Effects of autumn foliar application of 15N-urea on nitrogen storage and reuse in apple.
JPNUDS. Han, Z. Zeng, X.; Wang, F. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1989. v. 12 (6). p. 675-685. Includes references. (NAL Call No.: DNAL QK867.J67).

0426

Fruit quality, growth, and phosphorus increased with mono-ammonium phosphate fertilization of 'Golden Delicious' apple trees in a low-phosphorus soil.
JPNUDS. Raese, J.T. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. Paper presented at the "Tenth International Plant Nutrition Colloquium," August 4-9, 1986, Beltsville, Maryland. 1987. v. 10 (9/16). p. 2007-2015. Includes references. (NAL Call No.: DNAL QK867.J67).

0427

Growth of apple seedlings on sludge-amended soils in the greenhouse.
CSDSA2. Korcak, R.F. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. Oct 1986. v. 17 (10). p. 1041-1054. Includes references. (NAL Call No.: DNAL S590.C63).

0428

Impact of woolly apple aphid (Homoptera: Aphididae) on the growth of potted apple trees.
JEENAI. Weber, D.C. Brown, M.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1988. v. 81 (4). p. 1170-1177. Includes references. (NAL Call No.: DNAL 421 J822).

0429

Improved performance of bearing 'Delicious' apple trees with nitrogen and phosphate fertilization in a low-phosphorus soil.
JOSHB. Raese, J.T. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Sept 1986. v. 111 (5). p. 665-669. Includes references. (NAL Call No.: DNAL 81 SO12).

0430

Influence of calicum and mangnesium salts on acid soil chemistry and calcium nutrition of apple.
SSSJD4. Pavan, M.A. Bingham, F.T.; Peryea, F.J. Madison, Wis. : The Society. Soil Science Society of America journal. Nov/Dec 1987. v. 51 (6). p. 1526-1530. Includes references. (NAL Call No.: DNAL 56.9 SO3).

0431

Influence of soil on fruit production.
NEMFA. Veneman, P.L.M. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 56-60. Includes references. (NAL Call No.: DNAL 81 M384).

0432

Renovation of a pear orchard site with sludge compost.
CSOSA2. Korcak, R.F. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. Nov 1986. v. 17 (11). p. 1159-1168. Includes references. (NAL Call No.: DNAL S590.C63).

0433

Response of 'Delicious' apple trees in the greenhouse to rates and forms of nitrogen and phosphorus in a low-phosphorus soil.
HJHSA. Raese, J.T. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1985. v. 20 (2). p. 234-236. Includes 22 references. (NAL Call No.: DNAL SB1.H6).

0434

Annual deblossoming increases fire blight susceptibility of 'Golden Delicious'/M.9 apple trees.
FVRJA. Schupp, J.R. Ferree, D.C. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 40-44. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

0435

Assembly line plants take root.
AGREA. Comis, D. Wood, M. Washington, D.C. : The Administration. Agricultural research - U.S. Department of Agriculture, Agricultural Research Service. Apr 1986. v. 34 (4). p. 6-11. ill. (NAL Call No.: DNAL 1.98 AG84).

0436

Cold hardening of in vitro apple and saskatoon shoot cultures.
HJHSA. Caswell, K.L. Tyler, N.J.; Stushnoff, C. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1986. v. 21 (5). p. 1207-1209. Includes references. (NAL Call No.: DNAL SB1.H6).

0437

Cytokinins in apple leaves and their relationship to spotted tentiform leafminer injury.
HJHSA. Shantz, G.M. Proctor, J.T.A.; Chiba, M. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1988. v. 23 (5). p. 878-879. Includes references. (NAL Call No.: DNAL SB1.H6).

0438

Daminozide, root pruning, trunk scoring, and trunk ringing effects on fruit ripening and storage behavior of 'McIntosh' apple.
JOSHB. Elfving, D.C. Lougheed, E.C.; Cline, R.A. Alexandria, Va. : The Society. A midsummer foliar daminozide (DZ) application (750 mg a.i./liter) to 'Macspur McIntosh'/M.7 apple trees (Malus domestica Borkh.) reduced preharvest drop and retarded flesh firmness loss and starch hydrolysis when tested at harvest; DZ also reduced fruit ethylene production at harvest and after 19 weeks of storage at 0.5C. Root pruning at full bloom (May) resulted in increased soluble solids concentration (SSC) and firmer flesh and less starch hydrolysis at harvest, but not consistently each year. Full-bloom root pruning reduced the incidence of stem-cavity browning and brown core, but again not each year. Full-bloom root pruning did not influence ethylene evolution at harvest but did reduce post-storage ethylene evolution in two of three seasons. Full-bloom root pruning generally was less effective than DZ in altering fruit behavior, while root pruning later than full bloom had virtually no effect. Trunk scoring or ringing increased SSC and retarded loss of flesh firmness before harvest and following storage, but had little effect on starch hydrolysis. Scoring or ringing decreased incidence of some disorders and reduced post-storage ethylene evolution, although these treatments had little effect on ethylene production at harvest. Trunk scoring influenced some fruit characteristics more strongly than DZ. Fruit size was not affected by any treatment in any year. Journal of the American Society for Horticultural Science. Mar 1991. v. 116 (2). p. 195-200. Includes references. (NAL Call No.: DNAL 81 SO12).

0439

Desiccation tolerance in bare-rooted apple trees prior to transplanting.
Chen, T.H.H. Murakami, P.; Lombard, P.; Fuchigami, L.H. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1991. v. 9 (1). p. 13-17. Includes references. (NAL Call No.: DNAL SB1.J66).

0440

Development of oxygen concentration gradients in flesh tissues of bulky plant organs.
JOSHB. Rajapakse, N.C. Banks, N.H.; Hewett, E.W.; Cleland, D.J. Alexandria, Va. : The Society. Steady-state oxygen diffusion in flesh of apples (Malus domestica Borkh. cvs. Braeburn and Cox's Orange Pippin), Asian pears (Pyrus serotina Rehder. cvs. Hosui and Kosui), and nectarines Prunus persica (L.) Batsch. cvs. Red Gold and Sunglo was studied using a nondestructive method at 20C. Fruit flesh was found to exert a significant resistance to O2 diffusion resulting in measurable O2 gradients between tissues immediately beneath the skin and those at the fruit center for all these fruits. The magnitude of these D2 gradients varied between crops and cultivars and depended on the respiration rate and on effective O2 diffusivity in fruit flesh (Dc). Values of Dc varied with the cultivar and were broadly consistent with intercellular space volume. The range of Dc values obtained suggested that O2 diffusion in fruit flesh takes place in a combination of series and parallel modes in the intercellular space and fluid/solid matrix of the flesh. The results imply that D2 diffusivity in flesh tissues must be taken into consideration in the determination of critical external O2 level in controlled/modified atmosphere (CA/MA) storage. Journal of the American Society for Horticultural Science. Sept 1990. v. 115 (5). p. 793-797. ill. Includes references. (NAL Call No.: DNAL 81 SD12).

0441

Development of the amorphous layer (protective layer) in xylem parenchyma of cv. Golden Delicious apple, cv. Loring peach, and willow.
AJBOAA. Schaffer, K. Wisniewski, M. Columbus, Ohio : Botanical Society of America. American journal of botany. Nov 1989. v. 76 (11). p. 1569-1582. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

0442

Distribution and survival of eggs of summerform pear psylla (Homoptera: Psyllidae) affected by leaf midvein.
EVETEX. Horton, D.R. Lanham, Md. : Entomological Society of America. Distribution of pear psylla eggs on pear seedlings and cues affecting oviposition were monitored. Most eggs were deposited on the youngest foliage; few eggs were placed on the oldest, leathery leaves. Highest densities occurred adjacent to the midvein or in leaf serrations. Densities were very low on the leaf blade away from the midvein. Oviposition was induced in areas normally avoided (e.g., leaf blade) by providing strips of tape as artificial structures resembling midveins. Masking of particularly prominent midveins with strips of tape resulted in reduction of oviposition in these normally preferred sites. These results suggest that the midvein provided positive mechanical cues to ovipositioning females. Effects of egg location on survival and development of eggs was quantified. Survival rates of eggs were higher for eggs deposited along the midvein than those deposited on the leaf blade. Survival decreased with increasing plant water stress. Development rates of eggs were not affected by location or stress. Environmental entomology. June 1990. v. 19 (3). p. 656-661. Includes references. (NAL Call No.: DNAL QL461.E532).

0443

Effect of European red mite (Acari: Tetranychidae) injury on vegetative growth and flowering of four cultivars of apples.
EVETEX. Beers, E.H. Hull, L.A. Lanham, Md. : Entomological Society of America. Effect of European red mites (ERM), Panonychus ulmi (Koch), on nonbearing spur-type and standard 'Delicious', 'Golden Delicious', and 'Stayman' apple trees was compared over a 3-yr period. Mite population levels ranged from ca. 0-2,000 mite-d, with each tree receiving about the same amount of mite-days each year. Shoot length, leaf numbers, and trunk girth were little affected by mite damage, but early defoliation occurred on 'Golden Delicious' and standard 'Delicious'. Flowering was reduced on 'Golden Delicious' and 'Stayman', but not on either of the 'Delicious' types. In general, 'Delicious' appeared to be more tolerant of ERM damage. Environmental entomology. Apr 1987. v. 16 (2). p. 569-574. Includes references. (NAL Call No.: DNAL QL461.E532).

0444

Effect of micronutrients, phosphorous and chelator to iron ratio on growth, chlorosis and nutrition of apple seedlings.
JPNUDS. Tong, Y.A. Fan, F.; Korcak, R.F.; Chaney, R.L.; Faust, M. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1986. v. 9 (1). p. 23-41. ill. Includes references. (NAL Call No.: DNAL QK867.J67).

0445

Effect of paclobutrazol and analogs on growth, yield, fruit quality, and storage potential of 'Delicious' apples.
JOSHB. Greene, D.W. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. May 1986. v. 111 (3). p. 328-332. Includes references. (NAL Call No.: DNAL 81 SO12).

0446

Effect of preharvest pear fruit maturity on decay resistance.
PLDIDE. Spotts, R.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. May 1985. v. 69 (5). p. 388-390. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0447

Effect of rosy apple aphid and spirea aphid (Homoptera: Aphididae) on dry matter accumulation and carbohydrate concentration in young apple trees.
JEENAI. Varn, M. Pfeiffer, D.G. Lanham, Md. : Entomological Society of America. One-year-old apple trees grown in pots were artificially infested with either Dysaphis plantaginea (Passerini) or Aphis spiraecola Patch. Feeding by D. plantaginea on 22-53% of the leaves on the tree significantly reduced accumulation of dry weight in all portions of the trees during the first season's growth. At the 10-leaf stage of the second season, dry weights of trees infested with D. plantaginea during the previous year were still significantly lower than those of control trees. A spiraecola did not reduce the accumulation of dry weight by the young trees. Journal of economic entomology. Apr 1989. v. 82 (2). p. 565-569. Includes references. (NAL Call No.: DNAL 421 J822).

0448

Effect of seasonal soil waterlogging on vegetative growth and fruiting of apple trees.
JOSHB. Olien, W.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Mar 1987. v. 112 (3). p. 209-214. ill. Includes references. (NAL Call No.: DNAL 81 SO12).

0449

Effects of autumn foliar application of 15N-urea on nitrogen storage and reuse in apple.
JPNUDS. Han, Z. Zeng, X.; Wang, F. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1989. v. 12 (6). p. 675-685. Includes references. (NAL Call No.: DNAL QK867.J67).

0450

Effects of fungicides that inhibit ergosterol biosynthesis on apple powdery mildew control, yield, and fruit growth factors.
PLDRA. Spotts, R.A. Cervantes, L.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1986. v. 70 (4). p. 305-306. Includes 16 references. (NAL Call No.: DNAL 1.9 P69P).

0451

The effects of root pruning on apples.
CFRTA. Schupp, J.R. Ferree, D.C. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. 1987. v. 20. p. 76-80. ill. Includes references. (NAL Call No.: DNAL 93.5 D96).

0452

An evaluation of stop drop materials in 1986.
NEMFA. Greene, D.W. Kaminsky, K.; Sincuk, J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 74-78. (NAL Call No.: DNAL 81 M384).

0453

Field evaluations of frost injury to deciduous fruit trees as influenced by ice nucleation-active Pseudomonas syringae.
JOSHB. Proebsting, E.L. Jr. Gross, D.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. July 1988. v. 113 (4). p. 498-506. Includes references. (NAL Call No.: DNAL 81 SD12).

0454

Field performance of Malus sargentii as a rootstock for four commercial apple varieties.
FVRJA. Dlien, W.C. Stiles, W.C.; McCrum, R.C. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1986. v. 40 (4). p. 140-143. Includes references. (NAL Call No.: DNAL 80 F9464).

0455

Flowering of apple trees in the second year is increased by first-year P fertilization.
HJHSA. Neilsen, G.H. Hogue, E.J.; Parchomchuk, P. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1990. v. 25 (10). p. 1247-1250. Includes references. (NAL Call No.: DNAL SB1.H6).

0456

Gas exchange characteristics of apple and peach leaves infested by European red mite and twospotted spider mite.
JDSHB. Mobley, K.N. Marini, R.P. Alexandria, Va. : The Society. Greenhouse-grown 'Imperial Delicious' apple (Malus domestica Borkh.) and 'Redhaven' peach (Prunus persica Batsch.) trees were inoculated during the summer with three densities of European red mite (ERM) (Panonychus ulmi Koch) and twospotted spider mite (TSM) (Tetranychus urticae Koch). As ERM- and TSM-days increased, net photosynthesis (Pn), transpiration (Tr), and total chlorophyll content (TCHL) of apple leaves decreased linearly. At similar densities, TSM was more damaging than ERM to apple leaf gas exchange. Water-use efficiency (WUE) of apple declined similarly with increasing mite-days for both mite species. Specific leaf weight (SLW) of apple increased with TSM-days. Pn, Tr, TCHL, and WUE of peach declined linearly with increasing ERM- and TSM-days, and the rates of decline were similar for both mite species. Mites did not affect peach SLW. These results indicate that greenhouse-grown peach is more tolerant than apple to mite feeding. Journal of the American Society for Horticultural Science. Sept 1990. v. 115 (5). p. 757-761. Includes references. (NAL Call No.: DNAL 81 SD12).

0457

Germination and appressorium formation by Venturia inaequalis during infection of apple seedling leaves.
PLDRA. Turner, M.L. MacHardy, W.E.; Gadoury, D.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1986. v. 70 (7). p. 658-661. Includes 21 references. (NAL Call No.: DNAL 1.9 P69P).

0458

Growing conditions influence mite damage on apple and peach leaves.
HJHSA. Campbell, R.J. Mobley, K.N.; Marini, R.P. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1990. v. 25 (4). p. 445-448. Includes references. (NAL Call No.: DNAL SB1.H6).

0459

Growth of apple seedlings on sludge-amended soils in the greenhouse.
CSDSA2. Korcak, R.F. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. Dct 1986. v. 17 (10). p. 1041-1054. Includes references. (NAL Call No.: DNAL S590.C63).

0460

Growth reduction in nonbearing apple trees by woolly apple aphids (Homoptera: Aphididae) on roots.
JEENAI. Brown, M.W. Schmitt, J.J. Lanham, Md. : Entomological Society of America. The effect of root-feeding populations of woolly apple aphids, Eriosoma lanigerum (Hausmann), on newly planted, nonbearing apple trees in an orchard environment was studied. Roots of two-thirds of the 351 'Red Delicious' study trees were artificially infested with woolly apple aphids from a laboratory colony in 1986, 1 mo after planting. The artificial infestation resulted in 95% of the trees being infested (including controls), but did not produce more severe root infestations per tree than expected in natural infestations. The root infestation rating (mean = 0.35 on a scale of 0-1, SEM = 0.18) determined from destructive sampling of one-third of the orchard after three growing seasons was not correlated with population density above ground throughout the 3 yr of the study. Root feeding marginally reduced branch growth in the first and third year after infestation, crown length in the third year, and trunk diameter in the first and second years. Crown length was significantly reduced after 1 yr and trunk diameter was significantly reduced after 3 yr because of woolly apple aphid feeding on roots. Scion biomass also was significantly reduced by woolly apple aphid root feeding after 3 yr. We conclude that woolly apple aphid populations on roots have a slight, but significant, negative effect on growth of young nonbearing apple trees in the orchard environment. We also conclude that, because of the lack of correlation between woolly apple aphid populations aboveground and on roots, sampling branch terminals and pruning scars yields no information on the density of woolly apple aphids on roots. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1526-1530. Includes references. (NAL Call No.: DNAL 421 J822).

0461

Harvesting, storing, and handling processing apples.
Massey, L.M. Jr. New York : Van Nostrand Reinhold, c1989. Processed apple products / edited by Donald L. Downing. p. 31-51. ill. Includes references. (NAL Call No.: DNAL TP441.A6P76).

0462

Honey bee (Hymenoptera: Apidae) foraging during bloom in dimethoate-treated apple orchards.
JEENAI. Danka, R.G. Collison, C.H.; Hull, L.A. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1985. v. 78 (5). p. 1042-1047. Includes references. (NAL Call No.: DNAL 421 J822).

0463

How spur quality influences fruit size.
PWHAA. Rom, C.R. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 109-118. ill. Includes references. (NAL Call No.: DNAL 81 W273).

0464

Impact of woolly apple aphid (Homoptera: Aphididae) on the growth of potted apple trees.
JEENAI. Weber, D.C. Brown, M.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1988. v. 81 (4). p. 1170-1177. Includes references. (NAL Call No.: DNAL 421 J822).

0465

Improving the growth of newly planted apple trees.
HJHSA. Autio, W.R. Greene, D.W.; Cooley, D.R.; Schupp, J.R. Alexandria, Va. : American Society for Horticultural Science. Increasing the N application rate (in the form NH4ND3) to newly planted 'Marshall McIntosh'/M.9 apple (Malus domestica, Borkh.) trees beyond 76 g N per tree per year reduced growth in the first two growing seasons. Peat moss or composted manure mixed into the planting hole of 'Royal Gala'/M.26 increased growth in the first growing season after planting. The soil-active fungicides, fosetyl-Al and metalaxyl, increased trunk and shoot growth of 'Royal Gala'/M.26 in the first season after planting. Mulching enhanced growth of 'Gala'/M.26 only in the third season after planting, a season during which the region experienced a drought. Mulching significantly increased bloom on 'Gala'/M.26 2 years after planting. The growth of 'Royal Gala'/M.26, 'Marshall McIntosh'/M.26, and 'Ace Delicious'/M.26 was not affected by planting technique: planting by hand in 61-cm augered holes vs. planting with a mechanical tree planter. Chemical names used: N-(2,6-dimethyl-phenyl)-N-(methloxyacetyl) alanine methyl ester (metalaxyl); aluminum tris (O-ethyl phosphonate) (fosetyl-Al); 1,1'-dimethyl-4-4'-bipyridinium ion (paraquat); isopropylamine salt of N-(phosphonomethyl) glycine (glyphosate). HortScience. July 1991. v. 26 (7). p. 840-843. Includes references. (NAL Call No.: DNAL SB1.H6).

0466

The influence of calcium on senescence changes and physiological disorders in apples.
NEMFA. Bramlage, W.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 80-85. (NAL Call No.: DNAL 81 M384).

0467

Influence of orchard management systems on spur quality, light, and fruit within the canopy of 'Golden Delicious' apple trees.
JOSHB. Ferree, D.C. Alexandria, Va. : The Society. Trees of Golden Delicious' apple (Malus domestica Borkh.) were established in 1973 in the following orchard management systems: slender spindle (SS), trellis (TR), interstem hedgerow (IH), and pyramid hedgerow (PH). Spur quality and percent photosynthetic photon flux (PPF) transmission declined from the top to the bottom of the canopy of all systems. The three conical central leader type trees (SS, IH, PH) produced a quarter of their fruit on or close to the central leader, while the palmette-shaped TR produced 60% in the center sections along the wire trellis. There was no difference between vertical fruit distribution in trees in the more intensive systems (SS, TR), but the larger trees (IH, PH) produced twice as much fruit in the top half of the canopy as in the bottom half. Trees in the SS had a lower percentage or PPF transmission values within the canopy than trees in the TR systems. Trees in IH generally had higher PPF transmission values within the canopy than the larger PH trees. The number of leaves per spur and specific leaf weight of spur leaves generally followed the light distribution pattern, and trees in the TR and IH systems had higher-quality spurs than the SS and PH systems. The SS and TR systems appeared more responsive to the orientation of the sun, having higher light transmission values on east side of the canopy in the morning and side in the afternoon, than the IH or PH systems. Journal of the American Society for Horticultural Science. Nov 1989. v. 114 (6). p. 869-875. Includes references. (NAL Call No.: DNAL 81 SO12).

0468

The influence of soil density on dwarfing rootstocks and scion performance.
ARHMA. Fernandez, R.T. Perry, R.L. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 191-192. (NAL Call No.: DNAL 81 M58).

0469

Internal control of pear flowering and fruit development.
PWHAA. Lombard, P.B. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1986. (82nd). p. 149-160. ill. Includes references. (NAL Call No.: DNAL 81 W273).

0470

The 'Jonathan' apple and its progeny.
FVRJA. Rom, R.C. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 34-39. Includes references. (NAL Call No.: DNAL 80 F9464).

0471

Low oxygen delays budbreak of apple trees in greenhouse and prolongs storage life.
HJHSA. Young, E. Blankenship, S.M. Alexandria, Va. : American Society for Horticultural Science. Three percent oxygen significantly delayed and reduced budbreak of fully chilled apple (Malus domestica Borkh.) trees in a greenhouse. When ambient oxygen levels were restored, budbreak occurred normally. Apple trees stored under 3% +/- 1% oxygen at 6C for 35 weeks had no detectable bud development in storage. Budbreak and subsequent shoot growth were normal after the trees had been removed from storage. HortScience. July 1991. v. 26 (7). p. 890-891. Includes references. (NAL Call No.: DNAL SB1.H6).

0472

'Mc h' apples do not benefit from low ylene controlled-atmosphere storage.
HJHSA. Lau, O.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1989. v. 24 (5). p. 801-803. Includes references. (NAL Call No.: DNAL SB1.H6).

0473

The mechanism of regulation of 'Bartlett' pear fruit and vegetative growth by irrigation withholding and regulated deficit irrigation.
JOSHB. Chalmers, D.J. Burge, G.; Jerie, P.H.; Mitchell, P.D. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1986. v. 111 (6). p. 904-907. Includes references. (NAL Call No.: DNAL 81 SO12).

0474

My experiences with the Washington Apple Maturity Program.
ARHMA. Rasch, M. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1986. (116th). p. 80-85. Includes references. (NAL Call No.: DNAL 81 M58).

0475

A new plant growth regulator of microbial origin.
CHNCA8. Voblikova, V.D. Kobrina, N.S.; Gerasimova, N.M.; Pavlova, Z.N.; Dem'yanova, G.F.; Murygina, V.P.; Volosova, L.I.; Muromtsev, G.S. New York, N.Y. : Consultants Bureau. Chemistry of natural compounds. Translated from: Khimiia prirodnykh soedinenii, p. 387-391. (QD241.K45). May/June 1985. v. 21 (3). p. 362-365. Includes 7 references. (NAL Call No.: DNAL QD241.K453).

0476

Physiological effects of waxing on apples.
NEMFA. Bramlage, W.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1986. v. 92. p. 111-113. Includes 6 references. (NAL Call No.: DNAL 81 M384).

0477

Physiology and prediction of fruit tolerance to low-oxygen atmospheres.
JOSHB. Ke, D. Rodriguez-Sinobas, L.; Kader, A.A. Alexandria, Va. : The Society. Fruits of 'Granny Smith' and 'Yellow Newtown' apples (Malus domestica Borkh), '20th Century' pear (Pyrus serotina L.), and 'Angeleno' plum (Prunus domestica L.) were kept in air and in 0.25% or 0.02% O2, at 0, 5, or 10C for 3, 7, 14, 25, or 35 days to study the effects of low-O2, atmospheres on their postharvest physiology and quality attributes. Soluble solids content (SSC), pH, and external appearance were not significantly influenced, but resistance to CO2, diffusion was increased by the low-O2 treatments. Exposures to the low-O2 atmospheres inhibited ripening, including reduction in ethylene production rate, retardation of skin color changes and flesh softening, and maintenance of titratable acidity. The most important detrimental effect of the low-O2, treatments was development of an alcoholic off-flavor that had a logarithmic relation with ethanol content of the fruits. The ethanol content causing slight off-flavor (EO) increased with SSC of the commodity at the ripe stage, and it could be estimated using the following formula: (Log EO)/SSC = 0.228. Using SSC of ripe fruits and average ethanol accumulation rate per day (VE) from each low-O2 treatment, the tolerance limit (T1) of fruits to low-O2, atmospheres could be predicted as follows: T1 = EO/VE = (10(0.228 SSC))/VE. Journal of the American Society for Horticultural Science. Mar 1991. v. 116 (2). p. 253-260. Includes references. (NAL Call No.: DNAL 81 SO12).

0478

The prickly pears (Opunita spp.): plants with economic potential.
Russell, C.E. Felker, P. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Management and Utilization of Arid Land Plants," February 18-22, 1985, Saltillo, Mexico. Sept 1986. (135). p. 41. Includes references. (NAL Call No.: DNAL aSD11.A42).

0479

Principles of gas exchange in bulky plant tissues.
HJHSA. Solomos, T. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Factors that Influence Commodity Response to Controlled Atmosphere Storage of the XXII International Horticultural Congress/83rd ASHS Annual Meeting," August 14, 1986, Davis, California. Oct 1987. v. 22 (5). p. 766-771. Includes references. (NAL Call No.: DNAL SB1.H6).

0480

Reduction in transpiration and return bloom in apple by two sterol-inhibiting fungicides.
HJHSA. Biggs, A.R. Alexandria, Va. : American Society for Horticultural Science. HortScience. Nov 1990. v. 25 (11). p. 1403-1405. Includes references. (NAL Call No.: DNAL SB1.H6).

0481

Relationship between densities of pear psylla and twospotted spider mite and pear leaf nutrient levels.
HJHSA. Sugar, D. Righetti, T.L.; Westigard, P.H. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1989. v. 24 (2). p. 242-245. Includes references. (NAL Call No.: DNAL SB1.H6).

0482

Relationships between leaf: fruit ratio and varying levels of European red mite stress on fruit size and return bloom of apple.
JOSHB. Beers, E.H. Hull, L.A.; Grimm, J.W. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. July 1987. v. 112 (4). p. 608-612. Includes references. (NAL Call No.: DNAL 81 SO12).

0483

Response of micropropagated apple trees to field establishment procedures.
HJHSA. Zimmerman, R.H. Alexandria, Va. : American Society for Horticultural Science. Growth, flowering, and fruiting of micropropagated 'Jonathan' apple trees (Malus domestica Borkh.) transferred in Spring 1983 to the field from either a nursery, cold storage, or greenhouse were compared. First-year shoot and trunk growth was greatest for trees transplanted from the nursery and least for trees that were held in the greenhouse before being transferred to the field. Trees pruned low (35 cm) at planting time had more terminal shoot growth and less trunk cross-sectional area after the first growing season than those pruned high (90 cm). The effect of preplanting cultural practices on vegetative growth diminished in the 2nd year and disappeared by the end of the 3rd year in the orchard. Flowering began in 1985 and was only slightly affected by preplanting cultural practices and pruning treatments. Fruiting was not affected by the treatments. HortScience. Nov 1991. v. 26 (11). p. 1364-1365. Includes references. (NAL Call No.: DNAL SB1.H6).

0484

Ripening and storability of 'Marshall McIntosh' apples.
FVRJA. Autio, W.R. Bramlage, W.J.; Lord, W.J. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1990. v. 44 (1). p. 36-40. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

0485

Root hypoxia and storage breakdown of 'Jonathan' apples.
JOSHB. Gur, A. Meir, S. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Sept 1987. v. 112 (5). p. 777-783. Includes references. (NAL Call No.: DNAL 81 SO12).

0486

Rootstock affects ripening, size, mineral composition, and storability of 'Starkspur Supreme Delicious' in the 1980-81 NC-140 cooperative planting.
FVRJA. Autio, W.R. Barden, J.A.; Brown, G.R. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1991. v. 45 (4). p. 247-251. Includes references. (NAL Call No.: DNAL 80 F9464).

0487

Seasonal variation in leaf zinc concentration of apples receiving dormant zinc.
HJHSA. Neilsen, G.H. Alexandria, Va. : American Society for Horticultural Science. HortScience. Feb 1988. v. 23 (1). p. 130-132. Includes references. (NAL Call No.: DNAL SB1.H6).

0488

Suppression of apple bloom by fungicides that inhibit sterol synthesis.
PLDRA. Latham, A.J. Dozier, W.A. Jr.; Knowles, J.W.; Hollingsworth, M.H. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1985. v. 69 (9). p. 776-778. Includes 6 references. (NAL Call No.: DNAL 1.9 P69P).

0489

A tentative model to describe the respiration of stored apples.
JOSHB. Andrich, G. Fiorentini, R.; Tuci, A.; Zinnai, A.; Sommovigo, G. Alexandria, Va. : The Society. Using mathematical equations that describe the O2 mass-transfer and the enzymatic oxidation of the organic substrates of apples (Malus domestica Borkh.), we developed a kinetic model to correlate fruit respiration rate with environmental oxygen partial pressure (PO2). The kinetic determinations were carried out at room temperature using apples stored at 3 to 4C for 11 to 19 weeks. Results show that: 1) the calculated value of the Michaelis-Menten constant related to the enzymatic oxidation of the respiratory substrate (Km = 2.1 +/- 0.5.10-5 mol.kg-1) is close to that reported in the literature for cytochrome-c oxidase; 2) the located range of PO2 levels where O2 becomes the limiting factor in the respiration process (near 2.6 kPa at T = 20.5 +/- 1C) is close to those usually used on a commercial scale for controlled atmosphere storage. Journal of the American Society for Horticultural Science. May 1991. v. 116 (3). p. 478-481. Includes references. (NAL Call No.: DNAL 81 SO12).

0490

Timing of mite injury affects the bloom and fruit development of apple.
JEENAI. Beers, E.H. Hull, L.A. Lanham, Md. : Entomological Society of America. The time when injury by the European red mite, Panonychus ulmi (Koch), occurs on an apple tree was studied to determine if yield components and vegetative growth were affected. Apple trees were subjected to about 1,000 cumulative mite days at three different times: early season (early May to mid-June), midseason (mid-June to 1 August), and late season (1 August to mid-October). Midseason injury resulted in the greatest reduction in mean fruit weight at harvest as well as return bloom and fruit load the following season. Late-season injury resulted in a reduction of return bloom.

Early-season injury did not result in significant differences from the control for any of the response variables measured. On defruited trees, return bloom, percentage of set, and fruit load were not affected by early-season mite injury of the previous year. Percentage of set was not related to early-season injury occurring the same year. Journal of economic entomology. Apr 1990. v. 83 (2). p. 547-551. Includes references. (NAL Call No.: DNAL 421 J822).

0491

Toxicity of fungicides and an acaride to honey bees (Hymenoptera: Apidae) and their effects on bee foraging behavior and pollen viability on blooming apples and pears.
EVETEX. Mayer, D.F. Lunden, J.D. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1986. v. 15 (5). p. 1047-1049. Includes references. (NAL Call No.: DNAL QL461.E532).

0492

Transitory growth control of apple seedlings with less persistent triazole derivatives.
JPGRDI. Curry, E.A. Reed, A.N. New York, N.Y. : Springer. Journal of plant growth regulation. 1989. v. 8 (3). p. 167-174. Includes references. (NAL Call No.: DNAL QK745.J6).

0493

Tree nitrogen status and leaf canopy position influence postharvest nitrogen accumulation and efflux from pear leaves.
JOSHB. Sanchez, E.E. Righetti, T.L. Alexandria, Va. : The Society. 'Comice' pear trees (Pyrus communis L.) were fertilized with ammonium nitrate depleted in 15N in Spring 1987 and 1988. In Aug., Oct., and Nov. 1988, midleaves on current season shoots were sampled at three positions from the periphery to the center of the canopy. Total N/cm2 of leaf area remained almost constant through October, even though percent N concentration declined as specific leaf weight (SLW) increased. Furthermore, there was no substantial net change in either labeled or unlabeled N in either treatment until senescence began in October. Peripheral leaves contained higher levels of both reserve and newly acquired N than did less-exposed leaves. Despite large differences in N/cm2 for October samples, by November leaves from both high (HN) and low N (LN) trees exported similar percentages of their total N. The average N export to storage tissues irrespective of tree N status was 71%, 61%, and 52% for peripheral, medium, and interior leaves, respectively. The export of N was influenced more by the leaf position in the plant canopy than the nutritional status of the tree. Journal of the American Society for Horticultural Science. Nov 1990. v. 115 (6). p. 934-937. Includes references. (NAL Call No.: DNAL 81 SO12).

0494

Use of Osmia lignaria propinqua (Hymenoptera: Megachilidae) as a mobile pollinator of orchard crops.
EVETEX. Torchio, P.F. Lanham, Md. : Entomological Society of America. The development of intensive agricultural practices in areas that include cross-pollinated crops requires the introduction of large numbers of pollinating insects only during short flowering periods. The pollination efficacy of one pollinator, Osmia lignaria propinqua Cresson, would be greatly improved if nesting populations could be successfully transported from crop to crop. Results of a 5-yr study that was focused on this subject are summarized as follows. Two studies involved moving individual nest blocks various distances within orchards, two additional experiments tested the possibility of moving bees nesting in small nest shelters greater distances during active nesting periods, and one study tested transport of bees nesting in large nest shelters constructed on flat-bed trailers. All of the transported bees in the first four experiments abandoned established nests immediately after they were moved, and none of these bees reestablished nesting within the confines of experimental plots. Conversely, > 85% of females nesting in trailer-shelters continued to nest uninterruptedly after these large nest shelters were moved. Two additional Osmia species were also successfully transported when these large trailer-shelters were moved. A short discussion of nest orientation requirements expressed by Osmia is included. Environmental entomology. Apr 1991. v. 20 (2). p. 590-596. Includes references. (NAL Call No.: DNAL QL461.E532).

0495

Variation in host fruit volatiles attractive to apple maggot fly, Rhagoletis pomonella.
JCECD. Carle, S.A. Averill, A.L.; Rule, G.S.; Reissig, W.H.; Roelofs, W.L. New York, N.Y. : Plenum Press. Journal of chemical ecology. Apr 1987. v. 13 (4). p. 795-805. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0496

Where's the bloom--overcoming biennial bearing in apple trees.
PWHAA. Tvergyak, P. Agnew, K.; Williams, M. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1986. (82nd). p. 62, 64, 66, 68, 70, 72, 74, 76, 78, 80. Includes references. (NAL Call No.: DNAL 81 W273).

0497

Genetics and linkage analysis of 19 isozyme loci in apple.
JOSHB. Weeden, N.F. Lamb, R.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Sept 1987. v. 112 (5). p. 865-872. ill. Includes references. (NAL Call No.: DNAL 81 SO12).

0498

Mayhaws: trees of pomological and ornamental interest.
HJHSA. Payne, J.A. Krewer, G.W.; Fitenmiller, R.R. Alexandria, Va. : American Society for Horticultural Science. HortScience. Mar 1990. v. 25 (3). p. 246, 375. maps. Includes references. (NAL Call No.: DNAL SB1.H6).

0499

Penicillium solitum revived, and its role as a pathogen of pomaceous fruit.
PHYTA. Pitt, J.I. Spotts, R.A.; Holmes, R.J.; Cruickshank, R.H. St. Paul, Minn. : American Phytopathological Society. Penicillium solitum, a species neglected in recent taxonomies, is revived. A new description and related taxonomic information are given, based on examination of a number of fresh isolates from pome fruit and wooden fruit bin surfaces in Australia and from processed meats in Germany. Isolates of P. solitum were less virulent on apple and pear fruits than those of P. expansum, the dominant pathogenic Penicillium on pome fruits. P. solitum and P. expansum showed similar temperature growth curves, but growth of P. solitum was slower. All isolates of P. solitum from fruit and fruit storage bins in this study were insensitive to benomyl, but isolates from meat and cheese were sensitive to benomyl. Phytopathology. Oct 1991. v. 81 (10). p. 1108-1112. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Agricultural chemicals for North Carolina apples.
Walgenbach, J.F. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. Jan 1989. (37,rev.). 38 p. ill. (NAL Call No.: DNAL S544.3.N6N62).

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Walgenbach, J.F. (ed.). Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. Jan 1988. (37,rev.). 52 p. (NAL Call No.: DNAL S544.3.N6N62).

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Mahr, D.L. Jeffers, S.N.; Binning, L.K.; Stang, E.J. Madison, Wis. : The Research Division. Publication - Cooperative Extension Programs. University of Wisconsin - Extension. 1986. (A3314). 24 p. ill. (NAL Call No.: DNAL S544.3.W6W53).

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Mahr, D.L. Jeffers, S.N.; Binning, L.K.; Stang, E.J. Madison, Wis. : The Service. Publication - University of Wisconsin, Cooperative Extension Service. 1988. (A3314). 30 p. (NAL Call No.: DNAL S544.3.W6W53).

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Apple production in Arkansas.
Patterson, W.K. McDaniel, M.C.; Jones, B.F. Little Rock, Ark. : The Service. EC - University of Arkansas, Cooperative Extension Service. Nov 1988. (542,rev.). 73 p. (NAL Call No.: DNAL 275.29 AR4).

0505

Apple spray schedule for New Jersey home orchards.
Race, S.R. Springer, J.K. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. 1985. (112). 2 p. (NAL Call No.: DNAL S544.3.N5F7).

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Apple spray schedule for New Jersey home orchards.
Race, S.R. Springer, J.K. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. May 1985. (112). 2 p. (NAL Call No.: DNAL S544.3.N5F7).

0507

Arthropods in a scab, Venturia inaequalis (Cke.) Wint., (Ascomycetes: Mycosphaerellacea), and European red mite, Panonychus ulmi (Koch), (Acari: Tetranychidae), resistant apple orchard in Indiana.
FVRJA. Goonewardene, H.F. Bogyo, T.P. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 52-65. Includes references. (NAL Call No.: DNAL 80 F9464).

0508

Assessment of pesticide residues in surface and soil water from a commerical apple orchard.
AAREEZ. Weaver, J.E. Hogmire, H.W.; Brooks, J.L.; Sencindiver, J.C. New York, N.Y. : Springer. Soil water in the vadose zone and surface runoff water in a commercial apple orchard in an upland area of West Virginia were assessed for residues of pesticides normally applied for control of diseases, arthropod pests, and vole control. Water in the vadose zone was sampled at depths of 6, 12, 24, and 36 in. (0.15, 0.3, 0.6, and 0.9 m) with suction lysimeters from early spring to midfall for two consecutive years. Endrin was the only pesticide detected; it had been applied to the study site five times during the period of 1974 to 1981. None of the 17 pesticides applied under an Integrated Orchard Management program during this study were detected in water samples. Concentrations of endrin in soil water ranged from 0.1 to 13.2 ppb (microgram/L). About 20% of all soil water samples within the orchard tested positive (greater than or equal to 0.1 ppb) for this pesticide. Endrin was detected at all depths; however, the frequency of positive samples and levels of residues tended to decrease with depth of sampling. Only 4.3% of soil water samples collected offsite (105 ft downslope from the orchard) contained endrin; concentrations were less than 0.1 and 0.5 ppb in two samples from the 6-in depth. Endrin concentrations in soil from within the orchard were highly variable among the sites sampled. Mean concentrations (+/- SD) at surface (0-1 in.), 6, 12, 24, and 36 in. were 12,100 (+/- 11,200), 900 (+/- 800), 1,700 (+/- 1,800), 200 (+/- 300), and less than 10 (+/- 10) ppb (microgram/kg), respectively. Off-site (one sample), endrin was detected only at the surface and 6-in, depth at 750 and 46 ppb, respectively. Applied agricultural research. Winter 1990. v. 5 (1). p. 37-43. ill., maps. Includes references. (NAL Call No.: DNAL S539.5.A77).

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Challenges in organic fruit production.
ARHMA. Van Diepen, J. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1989. (119). p. 51-54. (NAL Call No.: DNAL 81 M58).

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Broembsen, S. von. Coppock, S.; Taylor, G. Stillwater, Okla. : The Service. OSU current report - Oklahoma State University, Cooperative Extension Service. Mar 1990. (6241,rev.). 5 p. (NAL Call No.: DNAL S451.0508).

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Commercial apple insect and disease control, 1989.
Coppock, S. Stillwater, Okla. : The Service. OSU current report - Oklahoma State University, Cooperative Extension Service. Apr 1989. (6241,rev.). 5 p. (NAL Call No.: DNAL S451.0508).

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Crabapples--a selection guide.
MUCBA. Peterson, C. Heatley, R. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Apr 1989. (2177). 8 p. ill. (NAL Call No.: DNAL 275.29 M58B).

0513

Development, implementation, and adoption of expert systems in plant pathology.
APPYA. Travis, J.W. Latin, R.X. Palo Alto, Calif. : Annual Reviews, Inc. Annual review of phytopathology. Literature review. 1991. v. 29. p. 343-360. Includes references. (NAL Call No.: DNAL 464.8 AN72).

0514

Disease and insect spray schedule for home orchards: apples, pears, crab apples--western Washington.
WUEXA. Byther, R.S. Antonelli, A.L. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. July 1989. (0846,rev.). 4 p. ill. (NAL Call No.: DNAL 275.29 W27P).

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Disease and insect spray schedule for home orchards: apples, pears, Eastern Washington.
WUEXA. Maloy, O.C. Retan, A.H. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Oct 1985. (836,rev.). 4 p. (NAL Call No.: DNAL 275.29 W27P).

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Disease and insect spray schedule for orchard: apples, pears, crab apples--western Washington.
WUEXA. Byther, R.S. Antonelli, A.L. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Mar 1986. (846,rev). 4 p. (NAL Call No.: DNAL 275.29 W27P).

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Effect of canopy density on pesticide deposition and distribution in apple trees.
PLDRA. Travis, J.W. Skroch, W.A.; Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1987. v. 71 (7). p. 613-615. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Effects of travel speed, application volume, and nozzle arrangement on deposition and distribution of pesticides in apple trees.
PLDRA. Travis, J.W. Skroch, W.A.; Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1987. v. 71 (7). p. 606-612. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Electronic sensing of plant canopy volume.
Giles, D.K. Delwiche, M.J.; Dodd, R.B. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1986 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1986. (fiche no. 86-1087). 35 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

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NEMFA. Prokopy, R.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 44-49. (NAL Call No.: DNAL 81 M384).

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Growing pears in North Carolina.
Williams, K.M. Werner, D.J. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. June 1987. (80,rev.). 13 p. ill. Includes references. (NAL Call No.: DNAL S544.3.N6N62).

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IMP in New York apple orchards--development, demonstration, and adoption.
NYFSB. Tette, J.P. Kovach, J.; Schwarz, M.; Bruno, D. Geneva, N.Y. : New York (State), Agricultural Experiment Station, Geneva. New York's food and life sciences bulletin. 1987. (119). 6 p. Includes references. (NAL Call No.: DNAL S95.E22).

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Impacts of the University of Connecticut integrated pest management program for apples 1984-1987 /prepared by: Roger G. Adams, Lorraine M. Los.
Adams, Roger G. Los, Lorraine M. Connecticut : Cooperative Extension System, University of Connecticut, College of Agriculture and Natural Resources, 1990? . Cover title.~ "90-22.". 24 p. : ill. ; 28 cm. (NAL Call No.: DNAL SB608.A6A33 1990).

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IPM scouting manual for apple producers.
ARHMA. Nugent, J.E. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 208. (NAL Call No.: DNAL 81 M58).

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Minimize problems with practical approaches.
WEFGA. Cowie, V. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Feb 1986. v. 106 (2). p. 49-51. (NAL Call No.: DNAL 80 G85W).

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Orchard crop loss assessments: A precondition for improved crop protection decisions.
OARCB. Hall, F.R. Wooster, Ohio : The Center. Research circular - Ohio Agricultural Research and Development Center. July 1990. (297). p. 50-59. Includes references. (NAL Call No.: DNAL 100 OH3R).

0527

Pear spray schedule for New Jersey home orchards.
Race, S.R. Springer, J.K. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. Apr 1986. (114). 2 p. (NAL Call No.: DNAL S544.3.N5F7).

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Relationship between pest control and method of chemical application.
ARHMA. Van Ee, G.R. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1989. (119). p. 162. (NAL Call No.: DNAL 81 M58).

0529

A spray system for multiple tier T-trellis apple orchards.
AAREEZ. Diener, R.G. Hogmire, H.W.; Elliot, K.C.; Nesselroad, P.E.; Blizzard, S.H. New York, N.Y. : Springer. A sprayer module was developed for T-trellis apples and mounted on an existing WVU mechanical harvester mainframe in place of the harvesting module.The sprayer module consisted of a Durand-Wayland model 100 LTS sprayer and two horizontal booms with four D2-13 hollow cone nozzles per boom which delivered spray from above and below the tree canopy. The lift capability of the harvester mainframe could elevate operator and sprayer together to spray any level of multiple tiered T-trellis systems. The hydrostatic drive, front wheel pivot steering, all terrain tires and solenoid valve controls provided excellent maneuverability, traction and ease of sprayer operation. The trellis sprayer provided control of insects and diseases comparable to an airblast sprayer in the outer canopy but was found to be superior in the center tree canopy region. The trellis sprayer is more economical to operate because it requires less horsepower since a fan is not needed for spray delivery. By taking advantage of the harvester mainframe to perform both spraying and harvesting operations, equipment costs would also be reduced. Applied agricultural research. Winter 1989. v. 4 (1). p. 62-67. ill. Includes references. (NAL Call No.: DNAL S539.5.A77).

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Tree-row-volume spraying rate calculator for apples.
HJHSA. Byers, R.E. Alexandria, Va. : American Society for Horticultural Science. HortScience. June 1987. v. 22 (3). p. 506-507. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

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CUCEB. Berkett, L.P. (ed.). Kollas, D.A. (ed.). Storrs, Conn. : The Service. Bulletin - Cooperative Extension Service, University of Connecticut. 1986. (86-16). 42 p. Includes references. (NAL Call No.: DNAL 275.29 C76B).

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Bird damage to apples in the mid-Hudson Valley of New York.
HJHSA. Tobin, M.E. Dolbeer, R.A.; Woronecki, P.P. Alexandria, Va. : American Society for Horticultural Science. HortScience. Dct 1989. v. 24 (5). p. 859. Includes references. (NAL Call No.: DNAL SB1.H6).

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Mower, K.M. Townsend, T.W.; Tyznik, W.J. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at the "Workshop on Wildlife Damage Control," Apr 17-20, 1989, Fort Collins, Colorado. July 1989. (171). p. 104. (NAL Call No.: DNAL aSD11.A42).

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Forbes, J.E. Canton, N.Y. : Agricultural Division, St. Lawrence County Cooperative Extension Association. St. Lawrence County cooperative extension news. Nov 1988. v. 72 (11). p. 6. (NAL Call No.: DNAL S544.3.N7S3).

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NEMFA. Lord, W.G. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 130-132. (NAL Call No.: DNAL 81 M384).

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Dynamics of pine vole populations in two Pennsylvania orchards.
AMNAA. Anthony, R.G. Simpson, D.A.; Kelly, G.M. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. July 1986. v. 116 (1). p. 108-117. Includes references. (NAL Call No.: DNAL 410 M58).

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HJHSA. Byers, R.E. Carbaugh, D.H. Alexandria, Va. : American Society for Horticultural Science. HortScience. Feb 1987. v. 22 (1). p. 46-48. Includes references. (NAL Call No.: DNAL SB1.H6).

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Matthew, David L. West Lafayette, IN : Cooperative Extension Service, Purdue University, 1986? . Abstract: This guide for commercial tree fruit growers includes 1986 Indiana tree fruit spray schedules and pesticide recommendations for apple, peach, cherry, pear and plum crops. It provides information on mite, mouse and weed control, growth regulators, chemical thinning, pesticide handling, safety, and Integrated Pest Management (IPM). 37 p. ; 28 cm. (NAL Call No.: DNAL 275.29 In2Id no.168).

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Influence of orchard floor management on vole and pocket gopher populations and damage in apple orchards.
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Issues in the development and marketing of reduced chemical agricultural products a look at disease-resistant apple cultivars /Cecile Murphy and Lois Schertz Willett.
Murphy, Cecile. Willett, Lois Schertz. Ithaca, N.Y. : Dept. of Agricultural Economics, New York State College of Agriculture and Life Sciences, Cornell University, 1991 . Cover title.~ "December 1991.". 42 p. ; 28 cm. Includes bibliographical references (p. 37-42). (NAL Call No.: DNAL 281.9 C81Ae no.91-34).

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WLSBA. Swihart, R.K. Bethesda, Md. : The Society. Wildlife Society bulletin. Summer 1990. v. 18 (2). p. 162-166. Includes references. (NAL Call No.: DNAL SK357.A1W5).

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NONGA. Rutter, M. Hamden, Conn. : The Association. Annual report of the Northern Nut Growers Association. 1988. (79th). p. 92-96. Includes references. (NAL Call No.: DNAL 94.69 N81).

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JCECD. Sullivan, T.P. Crump, D.R.; Sullivan, D.S. New York, N.Y. : Plenum Press. Journal of chemical ecology. Jan 1988. v. 14 (1). p. 363-377. Includes references. (NAL Call No.: DNAL QD415.A1J6).

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0554

1988 Illinois commercial tree fruit spray schedules / prepared by S.M. Ries ... et al. .
Ries, S. M. Urbana : Cooperative Extension Service, University of Illinois at Urbana-Champaign, 1988 . Abstract: This guide for commercial tree fruit growers includes 1988 Illinois tree fruit spray schedules and pesticide recommendations for apple, peach, cherry, pear and plum crops. It provides information on fungicide, insecticide and muticide harvest restrictions, mouse and weed control, growth regulators, chemical thinning, pesticide handling, safety, and Integrated Pest Management (IPM). Cover title.~ "January, 1988"--P. 4 of cover.~ "C-1151 S.". 40 p. ; 28 cm. (NAL Call No.: DNAL SB608.F8N56).

0555

1990 commercial apple: insect, disease, and weed control recommendations.
Patterson, M.G. Everest, J.W.; Powell, A.
Auburn, Ala. : The Service. Circular ANR - Alabama Cooperative Extension Service, Auburn University. In subseries: Integrated Pest Management. Jan 1990. (11). 11 p. ill. (NAL Call No.: DNAL S544.3.A2C47).

0556

Abundance and identification of the leafmining guild on apple in the Mid-Atlantic States.
GRLEA. Brown, M.W. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Winter 1990. v. 23 (4). p. 179-188. Includes references. (NAL Call No.: DNAL QL461.M5).

0557

Acaricide bioassays with spider mites (Acari: Tetranychidae) on pome fruits: evaluation of methods and selection of discriminating concentrations for resistance monitoring.
JEENAI. Knight, A.L. Beers, E.H.; Hoyt, S.C.; Riedl, H. Lanham, Md. : Entomological Society of America. Leaf disk bioassays with the acaricides avermectin B1, fenbutatin oxide, and hexythiazox were conducted with the mite species Panonychus ulmi(Koch), Tetranychus urticae Koch, and T. mcdanieli McGregor collected from apple andpear orchards in Washington. The effects of length of the bioassay period and inclusion of mite walk-off in mortality used to estimate LC50's with fenbutatin oxide and avermectin B1were examined. Correlations between LC50's after 48 and 72 h were significant with bothchemicals. However, large decreases in LC50's with fenbutatin oxide from 48 to 72 h indicatedthat the longer time allowed a more complete assessment of mite mortality. Comparisonof results from closed double-leaf and open single-leaf bioassays with fenbutatin oxidesuggested that mite walk-off should be included in mortality counts. Significant differences inLC50's were found among mite species for hexythiazox and avermectin B1, but not withfenbutatin oxide. P. ulmi was 20 and 2 times more tolerant to hexythiazox and avermectin B1, respectively, than the two Tetranychus species. Correlations among LC50's for acaricideswithin each species were not significant. In addition, partial correlations for species were not significant with LC50's for fenbutatin oxide and hexythiazox and fenbutatin oxide andavermectin B1. Discriminating concentrations for detection of incipient levels of resistance for hexythiazox were established for each species. Discriminating concentrations also were selectedfor the two Tetranychus species for avermectin B1. Journal of economic entomology. Oct 1990. v. 83 (5). p. 1752-1760. Includes references. (NAL Call No.: DNAL 421 J822).

0558

Activity of Avermectin B1 against codling moth (Lepidoptera: Olethreutidae).
JEENAI. Reed, D.K. Tromley, N.J.; Reed, G.L. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1985. v. 78 (5). p. 1067-1071. Includes references. (NAL Call No.: DNAL 421 J822).

0559

Activity of clofentezine against European red mite (Acari: Tetranychidae).
JEENAI. Welty, C. Reissig, W.H.; Dennehy, T.J.; Weires, R.W. Lanham, Md. : Entomological Society of America. The ovicidal and larvicidal activity of clofentezine against a population of European red mite (ERM), Panonychus ulmi (Koch), was evaluated in laboratory bioassays and compared with activity of hexythiazox. Clofentezine was more active against summer than winter eggs of ERM; LC(50) values of eggs in an early developmental stage differed by 11 times (1.01 and 11.1 ppm, respectively). Eggs of either type were significantly less susceptible to clofentezine when treated the day before hatch than when treated at earlier developmental stages (P less than 0.02). When exposed to leaves treated with 10-100 ppm clofentezine, mortality was high among larvae but negligible among nymphs and adults. The amount of clofentezine required to kill 50% of winter or summer eggs was half that of hexythiazox. Winter eggs surveyed from 31 commercial apple orchards in three regions of New York did not vary significantly (P = 0.11) in susceptibility to clofentezine at a concentration of 100 ppm, but eggs from Champlain Valley orchards were less susceptible than those from the Hudson Valley or Wayne County when tested at 10 ppm (P = 0.0003). Journal of economic entomology. Feb 1989. v. 82 (1). p. 197-203. Includes references. (NAL Call No.: DNAL 421 J822).

0560

Actographs for recording daily activity of plum curculio (Coleoptera: Curculionidae).
JEENAI. Racette, G. Hill, S.B.; Vincent, C. Lanham, Md. : Entomological Society of America. Two types of actographs were designed to study changes in daily activity of plum curculio, Conotrachelus nenuphar (Herbst), throughout two growing seasons in southwestern Quebec. The technique is based on plum curculio's thanatose behavior. During the time when adult plum curculio are active, they repeatedly climb up the walls of cages and drop to the floor. The rate at which they do so provides a measure of their activity. Two years' data indicated that their activity patterns change throughout the growing season. Before apple fruit set, plum curculio dropped mostly during the night. During fruit set and June drop, they remained active throughout the day and night. During mid-summer, the pattern of activity was less predictable. Adults resumed nocturnal dropping activity during the fall. Journal of economic entomology. Dec 1990. v. 83 (6). p. 2385-2392. Includes references. (NAL Call No.: DNAL 421 J822).

0561

Adult phenology and management of spotted tentiform leafminer (Lepidoptera: Gracillariidae) in North Carolina, South Carolina, and Georgia.
JEENAI. Walgenbach, J.F. Gorsuch, C.S.; Horton, D.L. Lanham, Md. : Entomological Society of America. Pheromone traps were used to study male flight phenology of spotted tentiform leafminer, Phyllonorycter blancardella (F.), in the major apple-producing regions of North Carolina, South Carolina, and Georgia from 1986 through 1988. Trapping data indicated that P. blancardella completes four and a partial fifth generation per season. Adult emergence in November was attributed to portions of the fourth-generation pupal population that did not enter diapause. These adults did not contribute to the overwintering population because sap-feeding larvae did not develop into tissue feeders during this time. Laboratory and field studies suggested that the appearance of P. blancardella in the southern United States is due to population resistance to organophosphorous insecticides. Leafminer control was achieved with several insecticides applied before bloom; however, applications of pyrethroids before bloom disrupted mite predator populations from 12 to 18 wk after applications. Journal of economic entomology. June 1990. v. 83 (3). p. 985-994. maps. Includes references. (NAL Call No.: DNAL 421 J822).

0562

Advantages and disadvantages of using pyrethroids in Nova Scotia apple orchards.
JEENAI. Hardman, J.M. Rogers, R.E.L.; MacLellan, C.R. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1737-1749. Includes references. (NAL Call No.: DNAL 421 J822).

0563

Agricultural decision support system design; the evoluation of EASY-MACS.
McInnis, P.J. Jr. Nyrop, J.P.; Wolf, W.A. Gainesville, FL : Florida Cooperative Extension Service, University of Florida, 1990 . Proceedings of the 3rd International Conference on Computers in Agricultural Extension Programs / Fedro S. Zazueta, editor. ; January 31-February 1, 1990, Grosvenor Resort Hotel, Disney World Village, Lake Buenavista, FL. p. 602-607. ill. (NAL Call No.: DNAL S494.5.D3I5 1990).

0564

Alightment of apple maggot flies on fruit mimics in relation to contrast against background.
FETMA. Prokopy, R.J. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Dec 1986. v. 69 (4). p. 716-721. Includes references. (NAL Call No.: DNAL 420 F662).

0565

Aphids in apples.
WUEXA. Youngs, L. Peterson, V.; Retan, A.H. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. In subseries: Insect Answers. Nov 1991. (1075,rev.). 3 p. (NAL Call No.: DNAL 275.29 W27P).

0566

Aphids in apples.
WUEXA. Youngs, L. Peterson, V.; Retan, A.H. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. In subseries: Insect Answers. Aug 1989. (1075,rev.). 4 p. ill. Includes references. (NAL Call No.: DNAL 275.29 W27P).

0567

Apple-and-thorn skeletonizer.
WUEXA. Suomi, D. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. July 1986. (1384). 2 p. ill. (NAL Call No.: DNAL 275.29 W27P).

0568

Apple aphids in Ohio /C.R. Cutright.
Cutright, Clifford Reginald, 1893-. Wooster, Ohio : Ohio Agricultural Experiment Station, 1930. Cover title. 59 p. : ill. ; 23 cm. Bibliography: p. 58-59. (NAL Call No.: DNAL 100 OH3S (2) no.464).

0569

Apple ermine moth.
WUEXA. Antonelli, A.L. LaGasa, E.; Bay, E.C. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Aug 1989. (1526). 2 p. ill. (NAL Call No.: DNAL 275.29 W27P).

0570

Apple ermine moth, Yponomeuta mallinellus Zeller: two components of female sex pheromone gland highly effective in field trapping tests.
JCECD. McDonough, L.M. Davis, H.G.; Smithhisler, C.L.; Voerman, S.; Chapman, P.S. New York, N.Y. : Plenum Press. When electroantennographic responses of male Yponomeuta malinellus Zeller to model compounds were determined at dosages of 0.3-30 ng, the strongest responses were obtained from (Z)-9-dodecen-1-ol acetate (Z9-12:Ac). Also, strong responses were obtained from (Z)-11-tetradecenal (Z11-14:Al) and (Z)-11-tetradecen-1-ol (Z11-14:OH). At a dosage of 0.3 ng, Z11-14:Al produced a stronger response than Z11-14:OH, while at a dosage of 30 ng, Z11-14:OH and Z11-14:Al produced equal responses. Gas chromatographic and mass spectral analysis of extracts of female sex pheromone glands showed the presence of Z9-12:Ac, tetradecan-1-ol (14:OH), (E)-11-tetradecen-1-ol (E11-14:OH), Z11-14:OH, hexadecan-1-ol, and hexadecan-1-ol acetate in a ratio of 0.6:200:37:100:140:35. In field tests, Z9-12:Ac and Z11-14:OH together were required for trap catch, and addition of Z11-14:Al, E11-14:OH, 14:OH, or (Z)-11-tetradecen-1-ol acetate did not increase catch. Ratios in rubber septa of 0.5:99.5 to 1.5:98.5 (Z9-12:Ac/Z11-14:OH) captured the most males and captures were statistically equivalent for dosages of 10-1000 microgram/rubber septum. Traps baited with the synthetic lure produced better catches than those baited with females. Journal of chemical ecology. Feb 1990. v. 16 (2). p. 477-486. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0571

Apple growers can get mites tested for susceptibility to miticides.
Reissig, H. Batavia, N.Y. : Agricultural Div. of Coop Extension, Four Western Plain Counties, N.Y. State. Ag impact. Apr 1989. v. 16 (4). p. 7-8. (NAL Call No.: DNAL S544.3.N7A45).

0572

Apple IPM in West Virginia.
Hogmire, H.W. Jr. Fayetteville, Ark. : Arkansas State Horticultural Society. Proceedings of the ... annual meeting - Arkansas State Horticultural Society. Paper presented at the "106th Annual Meeting of the Arkansas State Horticultural Society," November 13 and 14, 1985, Fort Smith, Arkansas. 1985. (106). p. 104-106. (NAL Call No.: DNAL SB21.A7A7).

0573

Apple leafminers and their parasites live in trees near orchards.
FOPSA. Maier, C.T. New Haven, Conn. : The Station. Frontiers of plant science - Connecticut Agricultural Experiment Station. Fall 1985. v. 38 (1). p. 4-6. ill. (NAL Call No.: DNAL 100 F92).

0574

Apple maggot.
WUEXA. Beers, E. Antonelli, A.L.; LaGasa, E. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. In subseries: Insect Answers. Aug 1991. (1603). 3 p. (NAL Call No.: DNAL 275.29 W27P).

0575

Apple maggot (Diptera: Tephritidae) response to traps in an unsprayed orchard in Oregon.
JEENAI. Aliniazee, M.T. Mohammad, A.B.; Booth, S.R. Lanham, Md. : Entomological Society of America. Eight and 10 different trap types were compared for their effectiveness in attracting the apple maggot, Rhagoletis pomonella (Walsh), adults during 1985 and 1986 seasons, respectively. Ladd yellow rectangles with red hemispheres in the center and a Ladd apple volatile attractant (consisting of a mixture of hexyl acetate, butyl 2-methyl butyrate, propyl hexanoate, hexyl propionate, butyl hexanoate, and hexyl butanoate in a 36:7:12:5:29:11 ratio) trapped the largest number of flies. This trap performed better than all other traps tested during both study years. Analysis of the ratios of positive response to traps suggests that the Ladd trap with red hemispheres and apple attractant was superior to both Pherocon AM and red sphere traps under both relatively low and high population density conditions. Other moderately effective traps were red spheres with Ladd attractant, Ladd yellow panels apple attractant did not increase the effectiveness of Pherocon AM trap. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1143-1148. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0576

Apple maggot (Diptera: Tephritidae) response to traps in an unsprayed orchard in Oregon.
JEENAI. Aliniazee, M.T. Mohammad, A.B.; Booth, S.R. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1143-1148. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0577

Apple maggot (Diptera:Trypetidae) control with insecticides and their residues in and on apples.
JEENAI. Belanger, A. Bostanian, N.J.; Rivard, I. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1985. v. 78 (2). p. 463-466. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0578

The apple maggot fly: a pest in orchards, a treasure in basic research.
NEMFA. Prokopy, R.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1985. v. 91. p. 83-91. (NAL Call No.: DNAL 81 M384).

0579

The apple maggot in Oregon.
Fisher, G. AliNiazee, M.T. Corvallis, Or. : The Service. FS, fact sheet - Oregon State University Extension Service. July 1986. (271,rev.). 2 p. ill. (NAL Call No.: DNAL 275.29 OR36).

0580

The apple maggot in Utah.
Karren, J.B. Logan, Utah : The Service. Extension leaflet - Cooperative Extension Service, Utah State University. Feb 1986. (213). 7 p. ill. (NAL Call No.: DNAL 275.29 UT1L).

0581

Apple maggot management in the western United States.
OASPA. AliNiazee, M.T. Corvallis, Or. : The Station. Special report - Oregon State University, Agricultural Experiment Station. In the series analytic: Ecology and management of economically important fruit flies / edited by M.T. AliNiazee. July 1988. (830). p. 73-81. Includes references. (NAL Call No.: DNAL 100 OR3M).

0582

Apple maggot update.
PWHAA. Freeman, J. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1986. (82nd). p. 94-96. (NAL Call No.: DNAL 81 W273).

0583

Apple maggot update.
PWHAA. Schwisow, M. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 184. (NAL Call No.: DNAL 81 W273).

0584

Apterona helix (Lepidoptera: Psychidae), a palearctic bagworm moth in North America: new distribution records, seasonal history, and host plants.
PESWA. Wheeler, A.G. Jr. Hoebeke, E.R. Washington, D.C. : The Society. Proceedings of the Entomological Society of Washington. Jan 1988. v. 90 (1). p. 20-27. ill. Includes references. (NAL Call No.: DNAL 420 W27).

0585

Area-wide population dynamics of Platynota idaeusalis (Lepidoptera: Tortricidae) in southcentral Pennsylvania pome and stone fruits.
EVETEX. Knight, A.L. Hull, L.A. Lanham, Md. : Entomological Society of America. Larval and egg mass sampling along with a sex pheromone trap grid consisting of 105 traps spaced 200 by 140 m apart were used to study the population biology of the tortricid, Platynota idaeusalis (Walker), among pome and stone fruits in Adams County, PA. Overwintering and summer populations were found beneath apple, pear, peach, and cherry on a wide variety of herbaceous plant species, especially Taraxacum officinalis, Rumex obtusifolius, and root suckers. In apple, larvae were found overwintering primarily beneath the tree canopy within 2 m of the trunk. Significantly more first-brood larval shelters were found on apple than on cherry, peach, or pear. However, the highest density of second-brood egg masses and male trap count s were found in cherry. No differences were found in second-brood egg mass density among five of the six apple cultivars sampled. Significantly higher fruit injury levels were found for 'Yorking' and 'Rome Beauty' than for 'Delicious,' 'Golden Delicious,' 'Stayman,' and 'Jonathon.' Fewer moths were caught in pheromone traps placed in fields and wooded sites than in orchards. Recapture of marked moths demonstrated that males moved throughout the study site. Environmental entomology. Dec 1988. v. 17 (6). p. 1000-1008. maps. Includes references. (NAL Call No.: DNAL QL461.E532).

0586

Areawide patterns of azinphosmethyl resistance in adult male Platynota idaeusalis (Lepidoptera: Tortricidae) in southcentral Pennsylvania.
JEENAI. Knight, A.L. Hull, L.A. Lanham, Md. : Entomological Society of America. Levels of resistance to azinphosmethyl in adult male

populations of Platynota idaeusalis (Walker) within apple, peach, pear, and cherry orchards and woodland from three regions in Adams County, Pa., were tested during 1986-1987. In Quaker Valley, significant differences among habitats were found only for brood I in 1986. However, LD50's were generally highest for populations within apple and lowest for populations in peach and woods for both years. In 1987, a significant population-within-crop effect was found only for brood II. LD50's of populations in three more northern orchards within Quaker Valley where azinphosmethyl + phosmet use was high were significantly higher than for two populations in southwestern apple orchards which received less of these pesticides. A comparison of three regions that varied in their mixture of crops and surrounding habitats in 1987 revealed no significant differences among regions. However, significant differences related to crops were found in brood II. LD50's of populations in apple in Quaker Valley and Fox Hill were significantly higher than for populations in cherry or peach within each region. Low-density, susceptible adult male populations were trapped from wooded sites 1.3-5.0 km from the nearest apple orchards. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1194-1200. maps. Includes references. (NAL Call No.: DNAL 421 J822).

0587

Arthropod community organization and development in pear.
EMNGD. Gut, L.J. Liss, W.J.; Westigard, P.H. New York, N.Y. : Springer-Verlag. Environmental management. Jan/Feb 1991. v. 15 (1). p. 83-104. Includes references. (NAL Call No.: DNAL HC79.E5E5).

0588

Arthropod resistance in plant introduction accessions of Malus sp. to some arthropod pests of economic importance.
FVRJA. Goonewardene, H.F. Povish, W.R. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1988. v. 42 (3). p. 88-91. Includes references. (NAL Call No.: DNAL 80 F9464).

0589

Artificial oviposition sphere for Mediterranean fruit flies (Diptera: Tephritidae) in field cages.
JEENAI. McInnis, D.O. Lanham, Md. : Entomological Society of America. Colored, polyethylene plastic balls were modified to serve as oviposition devices for a laboratory strain of the Mediterranean fruit fly, Ceratitis capitata (Wiedemann), in the laboratory and the field. In outdoor field cages, large balls (100 mm diameter) yielded significantly more eggs than small balls (25 mm diameter) for all four colors tested (black, red, yellow, and blue). Blue and yellow balls yielded fewer eggs than black or red balls for small and medium (50 mm diameter) sizes, whereas numbers oviposited in black, red, and yellow spheres were not significantly different for numbers laid in the large size. Twice as many eggs were laid into large balls when guava juice was used as an attractant as compared with water. Large black or red balls with guava juice gave roughly as many eggs as did Golden Delicious' apples, and three times as many eggs as did Red Delicious' apples. Laboratory flies oviposited three times as many eggs into large yellow balls with guava juice as did wild flies reared in fruit. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1382-1385. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0590

Attachment and dispersion of Callidosoma metzi (Acari: Erythraeidae) parasitizing Platynota idaeusalis (Lepidoptera: Tortricidae).
AESAAI. Adler, C.R.L. Brown, M.W. College Park, Md. : The Society. Annals of the Entomological Society of America. Jan 1986. v. 79 (1). p. 56-59. Includes references. (NAL Call No.: DNAL 420 EN82).

0591

Azinphosmethyl resistance and weight-related response of obliquebanded leafroller (Lepidoptera: Tortricidae) larvae to insecticides.
JEENAI. Reissig, W.H. Stanley, B.H.; Hebding, H.E. College Park, Md. : Entomological Society of America. Journal of economic entomology. Includes statistical data. Apr 1986. v. 79 (2). p. 329-333. Includes references. (NAL Call No.: DNAL 421 J822).

0592

Baited red sphere traps help control apple maggot.
Agnello, A. Batavia, N.Y. : Agricultural Div. of Coop Extension, Four Western Plain Counties, N.Y. State. Ag impact. June 1989. v. 16 (6). p. 8. ill. (NAL Call No.: DNAL S544.3.N7A45).

0593

Baseline bioassays with hexythiazox and clofentezine of three mite species (Acari: Tetranychidae) occurring on Washington and Oregon tree fruits.
JEENAI. Rathman, R.J. Beers, E.H.; Flexner, J.L.; Riedl, H.; Hoyt, S.C.; Westigard, P.H.; Knight, A.L. Lanham, Md. : Entomological Society of America. Eggs from Panonychus ulmi (Koch), Tetranychus urticae Koch, and T. mcdanieli McGregor collected from apple and pear orchards in Oregon and Washington were tested with the acaricides hexythiazox and

clofentezine to establish baseline responses before the compounds were registered and were widely used in the field. Within mite species, few significant differences were detected among LC50's for populations tested with either compound; differences at this response level ranged from 2- to5-fold. LC50's were significantly different between species; they werehigher for P. ulmi than for either T. urticae or T. mcdanieli. Although not significantly different, LC50's for both compounds were generally higher for T. mcdanieli than for T. urticae. LC50's for P. ulmi were three times higher for clofentezine than hexythiazox. For T. urticae, LC50's for bothchemicals were similar, but the LC50 for clofentezine with T. mcdanieli was somewhat lower than the LC50 for hexythiazox. LC50's for hexythiazox for populations of T. urticae collected from apple versus pear and populations collected from Medford, Oreg., versus morenorthern fruit-producing regions in Oregon and Washington were not significantly different.LC50's for clofentezine were not significantly different for populations of T. urticaecollected from apple and pear. Journal of economic entomology. Oct 1990. v. 83 (5). p. 1711-1714. Includes references. (NAL Call No.: DNAL 421 J822).

0594

Basing European red mite control decisions on a census of mites can save control costs.
NYFSB. Nyrop, J.P. Reissig, W.H. Geneva, N.Y. : New York (State), Agricultural Experiment Station, Geneva. New York's food and life sciences bulletin. 1988. (123). 3 p. (NAL Call No.: DNAL S95.E22).

0595

Behavior and monitoring of adult apple blotch leafminers.
NEMFA. Green, T.A. Prokopy, R.J.; Coli, W.H. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1985. v. 91. p. 74-82. Includes 7 references. (NAL Call No.: DNAL 81 M384).

0596

Behavioral interactions among formicid species in the ant mosaic of an organic pear orchard.
PPETA9. Paulson, G.S. Akre, R.D. San Francisco, Calif. : Pacific Coast Entomological Society. The Pan-Pacific entomologist. Oct 1991. v. 67 (4). p. 288-297. Includes references. (NAL Call No.: DNAL 421 P193).

0597

Behavioral management of apple maggot flies: an update.
NEMFA. Prokopy, R.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held at the Sheraton Sturbridge Resort and Conference Center on January 30 and 31, 1991. 1991. (97th). p. 107-110. (NAL Call No.: DNAL 81 M384).

0598

Better apples the low-spray way.
Ruttle, J. Emmaus, Pa. : Rodale Press. Rodale's organic gardening. Aug 1987. v. 34 (8). p. 48-52. ill. (NAL Call No.: DNAL S605.5.R64).

0599

Beyond the first stage of apple IPM in Massachusetts.
NEMFA. Prokopy, R.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held on January 6-7, 1988, Concord, New Hampshire. 1988. v. 94. p. 78-81. (NAL Call No.: DNAL 81 M384).

0600

Binomial sampling plans for tentiform leafminer (Lepidoptera: Gracillaridae) on apple in Utah.
JEENAI. Jones, V.P. Lanham, Md. : Entomological Society of America. The dispersion of Phyllonorycter elmaella Doganlar & Mutuura (Lepidoptera: Gracillaridae), a tentiform leafminer infesting apple in Utah, was investigated over a 3-yr period. According to Taylor's power law, mines are only slightly clumped on a per leaf basis (alpha = 1.14, beta = 1.05, r2 = 0.94). Two different binomial sampling plans based on a constrained negative binomial distribution were evaluated to estimate populations of leaf miners near the one to three mines per leaf economic threshold proposed for other leafminers of this genus attacking apple in the eastern United States. The proportion of leaves infested could not provide accurate predictions over 1.7 mines per leaf; however, the proportion of leaves infested with two or more mines predicted levels above three mines per leaf accurately. The use of this sampling plan in pest management programs is discussed. Journal of economic entomology. Apr 1991. v. 84 (2). p. 484-488. Includes references. (NAL Call No.: DNAL 421 J822).

0601

Binomial sequential classification sampling plans for European red mite (Acari: Tetranychidae) with special reference to performance criteria.
JEENAI. Nyrop, J.P. Agnello, A.M.; Kovach, J.; Reissig, W.H. Lanham, Md. : Entomological Society of America. Binomial sequential sampling procedures were developed for classifying the density of European red mites, Panonychus ulmi (Koch), with respect to four critical densities. Frequencies of erroneous classifications made using these sampling procedures and average sample sizes required to make classifications were compared with sequential sampling procedures that used complete counts of mites on leaves. The binomial procedures required approximately the same average sample size and had approximately the same frequency of erroneous classification. The sample size efficiency of the binomial sequential classification sampling plan was compared and found superior to the sample size efficiency of an estimation procedure based on binomial sampling. Field testing of one of the binomial sequential classification sampling plans showed that it rapidly and correctly classified mite densities. Journal of economic entomology. Apr 1989. v. 82 (2). p. 482-490. Includes references. (NAL Call No.: DNAL 421 J822).

0602

Biological activity of petroleum and cottonseed oils against two tetranychid mite species and two tortricid insect species found on apple.
Rock, G.C. Crabtree, K.W. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. July 1987. v. 4 (3). p. 247-253. Includes references. (NAL Call No.: DNAL SB599.J69).

0603

Biological control in integrated pest management: an entomological perspective.
Huffaker, C.B. Orlando, Fla. : Academic Press, 1985. Biological control in agricultural IPM systems / edited by Marjorie A. Hoy, Donald C. Herzog. Paper presented at the "Symposium on Biological Control in Agricultural Integrated Pest Management Systems" June 4-6, 1984, held at the Citrus Research and Education Center, University of Florida, at. p. 13-23. Includes references. (NAL Call No.: DNAL SB933.3.B548).

0604

Biology of Orius insidiosus (Heteroptera: Anthocoridae): a predator in Virginia apple orchards.
EVETEX. McCaffrey, J.P. Horsburgh, R.L. College Park, Md. : Entomological Society of America. Environmental entomology. Aug 1986. v. 15 (4). p. 984-988. Includes references. (NAL Call No.: DNAL QL461.E532).

0605

Biology of the codling moth in Hudson Valley orchards.
SHAGA. Dean, R.W. Ithaca, N.Y. : The Station. Search agriculture - New York State Agricultural Experiment Station, Ithaca. 1989. (36). 28 p. Includes references. (NAL Call No.: DNAL S95.E23).

0606

Biting into apple research.
AGREA. Corliss, J. Stanley, D. Washington, D.C. : The Service. Agricultural research - U.S. Department of Agriculture, Agricultural Research Service. Dec 1990. v. 38 (12). p. 18-23. (NAL Call No.: DNAL 1.98 AG84).

0607

Can ovipositing Rhagoletis pomonella females (Diptera: tephritidae) learn to discriminate among different ripeness stages of the same host biotype?.
FETMA. Prokopy, R.J. Papaj, D.R. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Sept 1989. v. 72 (3). p. 489-494. Includes references. (NAL Call No.: DNAL 420 F662).

0608

Characterization of resistance to dicofol in spider mites (Acari: Tetranychidae) from New York apple orchards.
JEENAI. Dennehy, T.J. Nyrop, J.P.; Reissig, W.H.; Weires, R.W. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1551-1561. Includes references. (NAL Call No.: DNAL 421 J822).

0609

Codling moth: male moth activity in response to pheromone lures and pheromone lures and pheromone-baited traps at different elevations within and between trees.
EVETEX. Howell, J.F. Schmidt, R.S.; Horton, D.R.; Khattak, S.U.K.; White, L.D. Lanham, Md. : Entomological Society of America. To characterize the behavior of codling moth, Cydia pomonella (L.), males to sex pheromone sources, we determined the lapsed time for response, number responding, and number of attempted pseudocopulations directed to pheromone placed at various heights in or near apple trees. The time for and number of responses was similar at any height as long as pheromone source was within and not outside the tree's canopy. Responses to pheromone and captures of moths were significantly lower for pheromone sources or traps outside the tree canopy, whether above, below or between trees. The maximum numerical response was at the 3.0-m

level, 1.0-1.5m from the top of the tree. In an unsprayed apple orchard, the number of moths caught in traps at 3.5 m was not significantly different from the number caught at 1.5 m, but in a sprayed orchard, the number caught at 3.5 m was significantly higher than at 1.5 m in six of 10 biweekly comparisons. Efficiency of low traps (1.5 m) relative to high traps depended on the position of the low trap in relation to the canopy. The canopy effect was larger than the height effect. Environmental entomology. June 1990. v. 19 (3). p. 573-577. Includes references. (NAL Call No.: DNAL QL461.E532).

0610

Commercial apple insect and disease control--1991.
Von Broembsen, S. Coppock, S.; Taylor, G. Stillwater, Okla. : The Service. OSU current report - Oklahoma State University, Cooperative Extension Service. Feb 1991. (6241). 6 p. (NAL Call No.: DNAL S451.0508).

0611

Commercial apple insect and disease control, 1989.
Coppock, S. Stillwater, Okla. : The Service. OSU current report - Oklahoma State University, Cooperative Extension Service. Apr 1989. (6241,rev.). 5 p. (NAL Call No.: DNAL S451.0508).

0612

Community structure of phytophagous arthropods on apple.
EVETEX. Brown, M.W. Adler, C.R.L. Lanham, Md. : Entomological Society of America. The phytophagous arthropod community on apple was studied in Virginia, West Virginia, Pennsylvania, and New York in 1983 and 1984. Managed, "organic" (reduced management), and abandoned orchards were sampled and the arthropod communities therein were compared to examine the effects of orchard management on the community. Williams's index, species richness, and evenness all showed significantly greatest diversity in abandoned orchards, intermediate diversity in "organic" orchards, and least diversity in managed orchards. Diversity in the "organic" orchard decreased during the 2 yr of study, showing the management class, ranged from 28 to 60%. Percentage of similarity and diversity indices indicated that cultivar and orchard age differences were not significant factors in comparisons among orchards. Communities were dominated by r-selected species in managed orchards and K-selected species in abandoned orchards. Community structure is hypothesized to be regulated by human-induced, environmental factors in managed orchards and by natural enemies in abandoned orchards. Environmental entomology. Aug 1989. v. 18 (4). p. 600-607. Includes references. (NAL Call No.: DNAL QL461.E532).

0613

Comparative toxicity of orchard insecticides to the apple blotch leafminer, Phyllonorycter crataegella (Lepidoptera: Gracillariidae), and its eulophid parasitoid, Sympiesis marylandensis (Hymenoptera: Eulophidae).
JEENAI. Van Driesche, R.G. Clark, J.M.; Brooks, M.W.; Drummond, F.J. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1985. v. 78 (4). p. 926-932. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0614

A computer management system for apple ("Malus X domestica" Borkh.) germplasm with resistance to diseases and arthropod pests.
Goonewardene, H.F. Rudkevich, V.; Grosso, R.; Williams, E.B. Beltsville, Md. : The Service. ARS - U.S. Department of Agriculture, Agricultural Research Service. Sept 1986. (53). 26 p. Includes references. (NAL Call No.: DNAL aS21.R44A7).

0615

Control of apple pests in Ontario.
ARHMA. Fisher, P. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 81-88. (NAL Call No.: DNAL 81 M58).

0616

Control of arthropods on apple, Malus X domestica (Borkh.), selections for scab (Ascomycetes: Mycosphaerellacea) and apple maggot (Diptera: Tephritidae) resistance in an orchard in Indiana.
JEENAI. Goonewardene, H.F. Pliego, G.; McCabe, G.P.; Howard, P.H.; Oliver, P.J. Lanham, Md. : Entomological Society of America. Three years of sampling an apple orchard with seven selections resistant to apple scab, Venturia inaequalis (Cke.) Wint., five of which were also resistant to apple maggot, Rhagoletis pomonella (Walsh), growing on three different rootstocks (EMVII, MM1106, and MM111), indicated a faunal composition consisting of eight orders from which 31 taxa in 21 families were identified. Among the 14 most frequently found groups in descending frequency were aphids, Aphis pomi De Geer and Dysaphis plantaginea Passerini; leafminer, Phyllonorycter blancardella (F.); plum curculio, Conotrachelus nenuphar (Herbst); codling moth, Cydia pomonella (L.); ants, Lasius neoniger (Emery) and Prenolepis imparis (Say); leafhoppers, Empoasca maligna Walsh, Jikradia olitoria (Say), Penthimia americana (Fitch), Scaphytopius sp., and Typhlocyba pomaria McAtee; tarnished plant bug, Lygus lineolaris (Palisot de Beauvois); green fruitworm, Lithophane antennata (Walker); flea beetle genera (unidentified); ladybird beetles, Adalia bipunctata (L.), Anatis sp.,

Brachiacantha ursina (F.), Coleomegilla maculata lengi Timberlake, Hippodamia convergens Guerin-Meneville, Myzia pullata (Say), and Olla v. nigrum Mulsant; apple maggot, Rhagoletis pomonella (Walsh); redbanded leafroller, Argyrotaenia velutinana (Walker); lacewing, Chrysopa carnea (Stevens); and green stink bug, Acrosternum hilare (Say). Direct inverse relationships were found between numbers of identified pests and predators. Significant differences in the incidence of arthropods were found among rootstocks and among selections. Based on these findings, we used a modified program of insecticides only (azinphosmethyl and carbaryl and fenvalerate and phosmet with water as the control applied 9, 36, and 81 d after full bloom), and obtained greater than or equal to 80% fruit without any, arthropod damage. The total crop was evaluated from fruit set to harvest The cost of chemicals per hectare for the azinphosmethyl and carbaryl program was $83.40;. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1426-1436. Includes references. (NAL Call No.: DNAL 421 J822).

0617

Control of arthropods on apple selections with scab (Ascomycetes: Mycophaerellacea) and European red mite (Acari: Tetranychidae) resistance.
JEENAI. Goonewardene, H.F. Pliego, G.; McCabe, G.P.; Howard, P.H.; Oliver, P.J. Lanham, Md. : Entomological Society of America. Use of pest and disease resistant cultivars in pest management is an alternative to commercial apple production that depends on use of chemical pesticides. Over a 3-yr period, we produced fruit that were 86% free of damage by key pests using selections with apple scab, Venturia inaequalis (Cke.) Wint, and European red mite, Panonychus ulmi (Koch) resistance and three critically timed sprays of either fenvalerate or phosmet. Although we did not use one, a fungicide may be needed to produce fruit that would grade well if summer diseases, Gloedes pomogena (Schw.) Colby and Leptothyrium pomi (Mont. & Fr.) Sacc. are a problem. The management program for these resistant selections produced a crop of undamaged fruit comparable with one that would be produced with a calendar-based spray program on commercially grown cultivars susceptible to pests and diseases. The cost of a program including eight sprays of insecticides, fungicides, and acaricides recommended in Indiana for apple production is $1,387.48 per season per hectare for cultivars not resistant to pests. This cost was reduced to $84.90 with phosmet or $240.00 per hectare with fenvalerate for the season when resistant selections were used. Summer disease control was not considered in our investigation but, if needed, two sprays of fungicide would cost $77.40 per season per hectare. Fruit damage related to rootstock or selection differences (or both) previously reported were not found, suggesting perhaps a masking of such effects by pesticide. Journal of economic entomology. Feb 1990. v. 83 (1). p. 180-188. Includes references. (NAL Call No.: DNAL 421 J822).

0618

Control of spider mites on pear in southern Oregon.
Westigard, P. Van Buskirk, P. Portland : The Society. Annual report - Oregon Horticultural Society. 1986. v. 77. p. 92-98. (NAL Call No.: DNAL 81 OR32).

0619

Control of spider mites on pear in southern Oregon.
PWHAA. Westigard, P. Van Buskirk, P. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 196-199. (NAL Call No.: DNAL 81 W273).

0620

Controlled-atmosphere cold storage as a quarantine treatment for nondiapausing codling moth (Lepidoptera: Tortricidae) larvae in apple.
JEENAI. Toba, H.H. Moffitt, H.R. Lanham, Md. : Entomological Society of America. Nondiapausing larvae of Cydia pomonella (L.) in immature apples were held in commercial controlled-atmosphere cold storage at 0 +/- 0.28 degrees C, 95-100% RH, and atmospheric components of 1.5-2.0% O2, <1% CO2, with the remainder being mainly N2. Based on adult emergence, survival decreased from 73% at 0 wk to 0% after a 13-wk exposure. A large-scale test of infested apples held in controlled-atmosphere cold storage for 13 wk resulted in no adult emergence from an estimated 142,021 immature larvae, including an estimated 40,389 fifth instars, the most tolerant stage. No live larvae or pupae were found when infested apples were sampled after treatment. Because codling moth eggs are also susceptible to low temperatures, controlled-atmosphere cold storage for a minimum of 13 wk is a potential quarantine treatment for codling moth eggs and larvae in apples. Journal of economic entomology. Aug 1991. v. 84 (4). p. 1316-1319. Includes references. (NAL Call No.: DNAL 421 J822).

0621

Controlling apple pests.
ORGAA. White, T. Emmaus, Pa. : Rodale Press. Organic gardening. July 1985. v. 32 (7). p. 86-89. ill. (NAL Call No.: DNAL 57.8 OR32).

0622

Controlling codling moth in Utah orchards.
UTSCB. Jones, V.P. Logan, Utah : The Station. Utah Science - Utah Agricultural Experiment Station. Winter 1987. v. 48 (4). p. 169-172. ill. Includes references. (NAL Call No.: DNAL 100 UT1F).

0623

Controlling pear mites.
WEFGA. Stockwin, W. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. June 1988. v. 108 (6). p. 8. ill. (NAL Call No.: DNAL 80 G85W).

0624

Corrugated fiberboard traps for predators overwintering in pear orchards.
JEENAI. Fye, R.E. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1985. v. 78 (6). p. 1511-1514. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0625

Cover crops affect insect and spider populations in apple orchards.
CAGRA. Altieri, M.A. Schmidt, L.L. Berkeley : The Station. California agriculture - California Agricultural Experiment Station. Jan/Feb 1986. v. 40 (1/2). p. 15-17. ill. (NAL Call No.: DNAL 100 C12CAG).

0626

Crabapple cultivar preferences of the plum curculio, Conotrachelus nenuphar (Herbst) (Coleoptera: Curculionidae).
FVRJA. Alm, S.R. Hall, F.R. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1986. v. 40 (3). p. 83-87. Includes 6 references. (NAL Call No.: DNAL 80 F9464).

0627

Crepuscular movement of Paraphlepsius irroratus (Say) (Hompoptera; Cicadellidae) between the groundcover and cherry trees.
EVETEX. Larsen, K.J. Whalon, M.E. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1987. v. 16 (5). p. 1103-1106. Includes references. (NAL Call No.: DNAL QL461.E532).

0628

Cyhexatin resistance and enhancement with calcium chloride in Washington state populations of spider mites (Acari: Tetranychidae) on pome fruit.
JESCEP. Tanigoshi, L.K. Babcock, J.M. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Apr 1990. v. 25 (2). p. 325-335. Includes references. (NAL Call No.: DNAL QL461.G4).

0629

Cyhexatin resistance in New York populations of European red mite (Acari: Tetranychidae).
JEENAI. Welty, C. Reissig, W.H.; Dennehy, T.J.; Weires, R.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Feb 1987. v. 80 (1). p. 230-236. Includes references. (NAL Call No.: DNAL 421 J822).

0630

Cytokinins in apple leaves and their relationship to spotted tentiform leafminer injury.
HJHSA. Shantz, G.M. Proctor, J.T.A.; Chiba, M. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1988. v. 23 (5). p. 878-879. Includes references. (NAL Call No.: DNAL SB1.H6).

0631

Dacus dorsalis flies can learn to find and accept host fruit.
JIBEE8. Prokopy, R.J. Green, T.A.; Vargas, R.I. New York, N.Y. : Plenum Publishing. Journal of insect behavior. Sept 1990. v. 3 (5). p. 663-672. Includes references. (NAL Call No.: DNAL QL496.J68).

0632

Damage from pear thrips is often detected too late.
Agnello, A. Batavia, N.Y. : Agricultural Div. of Coop Extension, Four Western Plain Counties, N.Y. State. Ag impact. Apr 1989. v. 16 (4). p. 4. (NAL Call No.: DNAL S544.3.N7A45).

0633

Damage threshold for pear psylla nymphs (Homoptera: Psyllidae).
JEENAI. Burts, E.C. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1988. v. 81 (2). p. 599-601. Includes references. (NAL Call No.: DNAL 421 J822).

0634

Damage to apple cultivars by races of European corn borer (Lepidoptera: Pyralidae).
JEENAI. Straub, R.W. Weires, R.W.; Eckenrode, C.J. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1986. v. 79 (2). p. 359-363. Includes references. (NAL Call No.: DNAL 421 J822).

0635

Decrease pesticide costs by using traps.
WEFGA. MacCollom, G.B. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Apr 1987. v. 107 (4). p. 42-43. Includes references. (NAL Call No.: DNAL 80 G85W).

0636

Demonstration of semiochemically induced aggregation in the green June beetle, Cotinis nitida (L.) (Coleoptera: Scarabaeidae).
EVETEX. Domek, J.M. Johnson, D.T. College Park, Md. : Entomological Society of America. A trapping study was conducted in an apple variety block to determine if feeding green June beetles (GJB), Cotinis nitida (L.) (Coleoptera: Scarabaeidae), produce semiochemicals that induce their aggregation. Yellow baffle and funnel traps were baited with fruit only (ripe peach slices), three males and three females (no fruit), six males (fruit access blocked), six males (free access to fruit), six females (fruit access blocked), and six females (free access to fruit). Traps were arranged in a Latin cube design (six row X six column) and randomized daily for 6 d. Analysis of data showed that column, day, treatment, and day by treatment interaction were significant sources of variation (P less than 0.01). Males or females feedingon ripe peach attracted significantly higher numbers of male and female beetles than all other treatments (Waller-Duncan k-ratio t test, k = 100, P less than 0.05). Environmental entomology. Apr 1988. v. 17 (2). p. 147-149. Includes references. (NAL Call No.: DNAL QL461.E532).

0637

A destructive bud-worm of apple trees (Haploa lecontei).
Garman, H. Lexington, Ky. : The Station. Circular - University of Kentucky Agricultural Experiment Station. Documents available from: Agriculture Library, Agricultural Science Center - North, University of Kentucky, Lexington, Ky. 40546-0091. June 1921. (25). p. 1-11. ill. (NAL Call No.: DNAL 100 K41).

0638

Development and evaluation of a control decision rule for first-generation spotted tentiform leafminer (Lepidoptera: Gracillariidae) in New York apple orchards.
EVETEX. Nyrop, J.P. Reissig, W.H.; Agnello, A.M.; Kovach, J. Lanham, Md. : Entomological Society of America. Environmental entomology. Oct 1990. v. 19 (5). p. 1624-1638. Includes references. (NAL Call No.: DNAL QL461.E532).

0639

Development and evaluation of a more efficient monitoring system for apple maggot (Diptera: Tephritidae).
JEENAI. Agnello, A.M. Spangler, S.M.; Reissig, W.H. Lanham, Md. : Entomological Society of America. A series of tests done in commercial and research apple (Malus domestica Borkh.) orchards during 1986-1988 evaluated different trap designs and treatment thresholds for apple maggot, Rhagoletis pomonella (Walsh). No difference in catch efficiency in unsprayed trees was observed among Ladd yellow-panel-plus-red-hemisphere traps, red wooden-sphere traps, and Olson sphere traps covered with standard, brushable, or diluted adhesive mixtures. Of 10 trap designs that we tested in 20 commercial orchards, all sphere traps baited with synthetic apple volatiles were more effective at catching apple maggot adults than were unbaited sphere traps, which caught more adults than did yellow-panel traps. In a test using the baited traps to time control sprays in commercial orchards, we achieved acceptable levels of control with a catch action threshold of eight adults per trap. With this threshold, 70% fewer sprays (2.8 fewer applications) were applied than in a calendar-based program. Trials in 16 blocks scouted by growers with baited traps and a threshold of five adults per trap for timing sprays resulted in 0.6 fewer applications and no difference in fruit infestation levels, compared with blocks sprayed according to the growers' conventional schedules. Despite the use of a threshold of five adults per trap, which was chosen to be more conservative than that in the research trials, growers did not always follow the recommended treatment guidelines. The use of this trapping system has been incorporated into current commercial pesticide recommendations for New York apple growers. Journal of economic entomology. Apr 1990. v. 83 (2). p. 539-546. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0640

Development of Platynota flavedana and P. idaeusalis (Lepidoptera: Tortricidae) at constant temperatures in the laboratory.
EVETEX. David, P.J. Horsburgh, R.L.; Holtzman, G.I. Lanham, Md. : Entomological Society of America. Environmental entomology. Feb 1989. v. 18 (1). p. 15-18. Includes references. (NAL Call No.: DNAL QL461.E532).

0641

Developmental rate, weight, and ovarian parameters of apple aphids, Aphis pomi (Homoptera: Aphididae), reared at one or two constant temperatures, with evidence of residual effects.
EVETEX. Carroll, D.P. Hoyt, S.C. College Park, Md. : Entomological Society of America. Environmental entomology. June 1986. v. 15 (3). p. 607-613. Includes references. (NAL Call No.: DNAL QL461.E532).

0642

Diapause in Platynota idaeusalis (Lepidoptera: Tortricidae): characterization of larval diapause under laboratory and field conditions.
EVETEX. Boyne, J.V. Rock, G.C. College Park, Md. : Entomological Society of America. Environmental entomology. Dec 1985. v. 14 (6). p. 797-804. Includes references. (NAL Call No.: DNAL QL461.E532).

0643

Diapause in Platynota idaeusalis (Lepidoptera: Tortricidae): effects of temperature, photoperiod, and time of inoculation in the field on diapause termination.
EVETEX. Boyne, J.V. Rock, G.C.; Nelson, L.A. College Park, Md. : Entomological Society of America. Environmental entomology. Dec 1985. v. 14 (6). p. 790-796. Includes references. (NAL Call No.: DNAL QL461.E532).

0644

Disease-resistant apple cultivars--a commercial alternative in low-input orchards?.
NEMFA. Berkett, L.P. Cooley, D.R. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held on February 1-2, 1989, Sturbridge, Massachusetts. Feb 1989. v. 95. p. 40-44. Includes references. (NAL Call No.: DNAL 81 M384).

0645

Dispersal of apple pests and natural enemies in Michigan.
Whalon, M.E. Croft, B.A. East Lansing, Mich. : The Station. Research report - Michigan State University, Agricultural Experiment Station. Dec 1985. (467). 23 p. ill. Includes references. (NAL Call No.: DNAL 284.9 M58).

0646

Dispersal of Paraphlepsius irroratus (Say) (Homoptera: Cicadellidae) in peach and cherry orchards.
EVETEX. Larsen, K.J. Whalon, M.E. Lanham, Md. : Entomological Society of America. Dispersal of the leafhopper vector of X-disease, Paraphlepsius irroratus (Say) within and into peach and cherry orchards was monitored by a mark, release, and recapture experiment. Field-collected adults were marked using fluorescent dyes and released at locations in and outside of two orchard sites. The marking method did not significantly affect leafhopper flight activity or survival. Dispersal was monitored using yellow sticky board traps for 21 d following each release, and the data were fitted to equations. The overall leafhopper recapture rate within 60 m was 2.35%. Dispersal rate for the first and second generations averaged 2.9 and 3.8 m/d. Wind was the major factor influencing leafhopper dispersal direction, as mean dispersal direction correlated significantly with mean wind direction (r = 0.94, P less than or equal to 0.05). Temperature affected leafhopper activity; this was particularly apparent with second-generation adults active at temperatures approximately 11 degrees C less than first-generation adults. There was no significant difference in the overall dispersal behavior between first and second-generations. Implications of this movement to the spread of X-disease are discussed. Environmental entomology. Oct 1988. v. 17 (5). p. 842-851. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

0647

Distribution and parasitism of winter moth, Operophtera brumata (Lepidoptera: Geometridae), in western Oregon.
EVETEX. Kimberling, D.N. Miller, J.C.; Penrose, R.L. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1986. v. 15 (5). p. 1042-1046. Includes references. (NAL Call No.: DNAL QL461.E532).

0648

Distribution and survival of eggs of summerform pear psylla (Homoptera: Psyllidae) affected by leaf midvein.
EVETEX. Horton, D.R. Lanham, Md. : Entomological Society of America. Distribution of pear psylla eggs on pear seedlings and cues affecting oviposition were monitored. Most eggs were deposited on the youngest foliage; few eggs were placed on the oldest, leathery leaves. Highest densities occurred adjacent to the midvein or in leaf serrations. Densities were very low on the leaf blade away from the midvein. Oviposition was induced in areas normally avoided (e.g., leaf blade) by providing strips of tape as artificial structures resembling midveins. Masking of particularly prominent midveins with strips of tape resulted in reduction of oviposition in these normally preferred sites. These results suggest that the midvein provided positive mechanical cues to ovipositioning females. Effects of egg location on survival and development of eggs was quantified. Survival rates of eggs were higher for eggs deposited along the midvein than those deposited on the leaf blade. Survival decreased with increasing plant water stress. Development rates of eggs were not affected by location or stress. Environmental entomology. June 1990. v. 19 (3). p. 656-661. Includes references. (NAL Call No.: DNAL QL461.E532).

0649

Distribution Campylomma verbasci (Heteroptera: Miridae) nymphs on apple and an assessment of two methods of sampling.
JEENAI. Thistlewood, H.M.A. McMullen, R.D. Lanham, Md. : Entomological Society of America. The distribution of Campylomma verbasci (Meyer) nymphs was examined on apple trees, Malus domestica Borkh., during May, from 1982 to 1984, in the Okanagan Valley, B.C. Cluster samples, limb sections, and the limb tap method were used for these studies. Nymphs were found primarily within flower clusters and were associated with the European red mite, Panonychus ulmi (Koch), or webbing of lepidopteran larvae. The efficiency of limb tap sampling was estimated to be 71% of the population in the region tapped, and its estimates of mean density were not affected by spatial, temporal, or varietal factors within orchards. With relative net precision as a measure of precision and cost, limb tap sampling was 1.9 to 5.3 times more efficient than cluster sampling for determination of nymphal density at economic levels. However, intensive sampling is required during short period to achieve levels of precision acceptable for integrated pest management programs. Journal of economic entomology. Apr 1989. v. 82 (2). p. 510-515. Includes references. (NAL Call No.: DNAL 421 J822).

0650

Diversification of agricultural landscapes--a vital element for pest control in sustainable agriculture.
Altieri, M.A. East Lansing, Mich. : Michigan State University Press, 1985. Sustainable agriculture & integrated farming systems : 1984 conference proceedings / edited by Thomas C. Edens, Cynthia Fridgen, Susan L. Battenfield. p. 166-184. Includes references. (NAL Call No.: DNAL S441.S8).

0651

Division of Entomology /C.H. Fernald. Division of Horticulture / Samuel T. Maynard.
Fernald, C. H. 1838-1921. Maynard, Samuel T._1844-1923. Amherst, Mass. : Hatch Experiment Station of the Massachusetts Agricultural College, 1888. 35 p. : ill. ; 23 cm. (NAL Call No.: DNAL 100 M38H (1) no.2).

0652

Division of Entomology /C.H. Fernald. Horticultural Department / Samuel T. Maynard. Department of Meteorology / C.D. Warner.
Fernald, C. H. 1838-1921. Maynard, Samuel T._1844-1923.; Warner, Clarence Duane. Amherst, Mass. : Hatch Experiment Station of the Massachusetts Agricultural College, 1888. 16 p. : ill. ; 23 cm. (NAL Call No.: DNAL 100 M38H (1) no.1).

0653

Dormant and delayed dormant sprays for the control of rosy apple aphids and scale insects /by W.S. Hough.
Hough, Walter Seneff, 1893-. Blacksburg, Va. : Virginia Polytechnic Institute. Virginia Agricultural Experiment Station, 1939. 31 p. : ill. ; 23 cm. (NAL Call No.: DNAL 100 V815 (1) no.322).

0654

Ecological selectivity: modifying chemical control practices to preserve natural enemies.
Hull, L.A. Beers, E.H. Orlando, Fla. : Academic Press, 1985. Biological control in agricultural IPM systems / edited by Marjorie A. Hoy, Donald C. Herzog. Paper presented at the "Symposium on Biological Control in Agricultural Integrated Pest Management Systems" June 4-6, 1984, held at the Citrus Research and Education Center, University of Florida, at. p. 103-122. ill. Includes references. (NAL Call No.: DNAL SB933.3.B548).

0655

Economic losses from the tarnished plant bug on apple in eastern New York.
Weires, R.W. VanKirk, J.R.; Gerling, W.D.; McNicholas, F.M. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. July 1985. v. 2 (3). p. 256-263. Includes references. (NAL Call No.: DNAL SB599.J69).

0656

Economic threshold for tarnished plant bug (Hemiptera: Miridae) in apple orchards.
JEENAI. Michaud, O.D. Boivin, G.; Stewart, R.K. Lanham, Md. : Entomological Society of America. Economic injury levels (EIL) and economic thresholds (ET) for tarnished plant bug, Lygus lineolaris (Palisot de Beauvois) on apple tree (Malus sylvestris Mill.) were established with sticky traps and a beating tray. ETs were based on 1987 apple and chemical control costs and assuming that a period of 24 h would be required for control implementation. EILs ranged from 0.5 to 2.8 cumulative captures per sticky trap and 0.8 to 4.5 cumulative captures per 50 limb taps, depending on the insecticide used and the period of apple tree phenology during which L. lineolaris were captured. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1722-1728. Includes references. (NAL Call No.: DNAL 421 J822).

0657

Effect of a foliar urea application and mite injury on yield and fruit quality of apple.
JEENAI. Beers, E.H. Hull, L.A.; Greene, G.M. Lanham, Md. : Entomological Society of America. Malus X domestica Borkhauser, 'Bisbee Delicious' and 'Rome Beauty' apple trees were subjected to varying amounts (range, approximately 20-1,140) of European red mite, Panonychus ulmi (Koch), injury and then treated with a foliar urea to determine if the effects of mite injury, could be mitigated. The effects of these treatments were determined on mean fruit weight, soluble solids, fruit firmness, fruit color, leaf nitrogen, and number of actively growing shoots at harvest, as well as return bloom, percentage of fruit set, and crop load the following season. Mean fruit weight, fruit firmness, and percentage of leaf nitrogen in August and September were affected by mite injury on 'Bisbee Delicious,' whereas with 'Rome Beauty' soluble solids, fruit color, and percentage of leaf nitrogen in August were affected by mite injury. The only effect of the urea application after mite injury was a reduction in red color of 'Bisbee Delicious.'. Journal of economic entomology. Apr 1990. v. 83 (2). p. 552-556. Includes references. (NAL Call No.: DNAL 421 J822).

0658

Effect of Aphis pomi (Homoptera: Aphididae) density on apples.
JEENAI. Hamilton, G.C. Swift, F.C.; Marini, R. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1986. v. 79 (2). p. 471-478. Includes references. (NAL Call No.: DNAL 421 J822).

0659

Effect of European red mite (Acari: Tetranychidae) injury on vegetative growth and flowering of four cultivars of apples.
EVETEX. Beers, E.H. Hull, L.A. Lanham, Md. : Entomological Society of America. Effect of European red mites (ERM), Panonychus ulmi (Koch), on nonbearing spur-type and standard 'Delicious', 'Golden Delicious', and 'Stayman' apple trees was compared over a 3-yr period. Mite population levels ranged from ca. 0-2,000 mite-d, with each tree receiving about the same amount of mite-days each year. Shoot length, leaf numbers, and trunk girth were little affected by mite damage, but early defoliation occurred on 'Golden Delicious' and standard 'Delicious'. Flowering was reduced on 'Golden Delicious' and 'Stayman', but not on either of the 'Delicious' types. In general, 'Delicious' appeared to be more tolerant of ERM damage. Environmental entomology. Apr 1987. v. 16 (2). p. 569-574. Includes references. (NAL Call No.: DNAL QL461.E532).

0660

Effect of food and perhaps larval crowding on diapause initiation in tufted apple bud moth (Lepidoptera: Tortricidae).
JESCEP. Boyne, J.V. Rock, G.C. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Oct 1986. v. 21 (4). p. 301-308. Includes references. (NAL Call No.: DNAL QL461.G4).

0661

Effect of host instar on successful parasitism by Pholetesor ornigis (Hymenoptera: Braconidae), parasitoid of Phyllonorycter blancardella (Lepidoptera: Gracillariidae).
EVETEX. Ridgway, N.M. Mahr, D.L. Lanham, Md. : Entomological Society of America. Pholetesor ornigis (Weed) is capable of parasitizing tissue-feeding larvae (fourth and fifth instars) as well as sap-feeding larvae (first, second, and third instars) of Phyllonorycter blancardella (F). In no-choice tests, similar numbers of offspring were produced on first-fourth instars but fewer on fifth instars. In choice tests P. ornigis produced similar numbers of offspring on first, second, and third instars, but fewer on fourth instars and none on fifth instars. In the field primarily sap-feeding larvae were available during the first three P. ornigis flight periods. However, tissue feeders were predominant during the partial fourth-generation flight period. Environmental entomology. Aug 1990. v. 19 (4). p. 1097-1102. Includes references. (NAL Call No.: DNAL QL461.E532).

0662

Effect of late-season fenvalerate and flucythrinate application on European red mite (Acari: Tetranychidae) and tufted apple bud moth (Lepidoptera: Tortricidae) populations on apple.
JEENAI. Hull, L.A. Knight, A.L. Lanham, Md. : Entomological Society of America. Field studies were conducted from 1982 to 1984 to investigate the effects of selectively time applications of the pyrethroids fenvalerate and flucythrinate on control of tufted apple bud moth, Platynota idaeusalis (Walker), and density of overwintering European red mite, Panonychus ulmi (Koch), eggs. The pyrethroids effectively controlled tufted apple bud moth, especially during Brood II, with only two alternate row-middle (ARM) applications in comparison with five ARM applications for standard organophosphate and carbamate insecticides. However, effect of the pyrethroid applications on the density of overwintering European red mite eggs depended on timing and rate. Applications of pyrethroids before 23 and 16 August in 1983 and 1984, respectively, increased the density of overwintering European red mite eggs in comparison with organophosphate and carbamate insecticides. A four-fold increase in the rate of fenvalerate was followed by an approximate three-fold

increase in overwintering European red mite egg density. Results suggested that selectively timed applications of pyrethroids during Brood II oviposition and egg hatch may be used to prevent fruit injury by tufted apple bud moth without causing an increase in the density of overwintering European red mite eggs. Journal of economic entomology. Aug 1989. v. 82 (4). p. 1174-1179. Includes references. (NAL Call No.: DNAL 421 J822).

0663

Effect of low temperatures on three embryonic stages of the codling moth (Lepidoptera: Tortricidae).
JEENAI. Moffitt, H.R. Burditt, A.K. Jr. Lanham, Md. : Entomological Society of America. Based on mortality, the order of tolerance of three embryonic stages of codling moth, Cydia pomonella (L.), eggs for temperatures near 0 degrees C was red ring white blackhead. Red ring stage eggs were 1.5 times more tolerant of low temperature than were white stage eggs egg 2.5 times more tolerant than blackhead stage eggs. Thirty-six, to 42 d exposure was required for complete mortality on mature Red Delicious' or Golden Delicious' apples. Tolerance of low temperature was not affected by the apple variety used as the substrate for oviposition. Eggs deposited on a substrate other than apples, such an plastic film, were significantly more susceptible to the effects of low temperature. Exposure to low temperatures such as those commonly used for short- or long-term fruit storage shows promise as an alternative to fumigation as a treatment for codling moth eggs on apples and pears after harvest. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1379-1381. Includes references. (NAL Call No.: DNAL 421 J822).

0664

Effect of pesticide applications on abundance of European red mite (Acari: Tetranychidae) and tryphlodormus pyri (Acari: Phytoseiidae) in Nova Scotian apple orchards.
JEENAI. Hardman, J.M. Rogers, R.E.L.; Nyrop, J.P.; Frisch, T. Lanham, Md. : Entomological Society of America. Pesticide use and mite counts were recorded in 38 apple orchards in 1985 and 46 orchards in 1986. Pesticides were scored on a scale from 1 (harmless) to 4 (harmful) according to their toxicity to the phytoseiid mite Typhlodromus pyri Scheuten. Counts of European red mite, Panonychus ulmi (Koch), were higher in orchards with higher total insecticide scores and more applications of certain insecticides (azinphosmethyl, cypermethrin, deltamethrin, dimethoate, and pirimicarb) and fungicides (benomyl and captan). T. pyri were found in 26% of the orchards surveyed in 1985 and 35% of those surveyed in 1986. Orchards with T. pyri bad higher counts of apple rust mite, Aculus schlechtendali (Nalepa), and were more likely to have had applications of the less toxic insecticides, pirimicarb and azinphosmethyl, than were the other orchards. Orchards with T. pyri also had lower seasonal scores for fungicide toxicity and fewer applications of the acaricidal fungicide, Dikar (a mixture of mancozeb and karathane), or the insecticide phosalone. In orchards with T. pyri, higher counts of the phytoseiid were associated with higher counts of apple rust mite, twospotted spider mite, Tetranychus urticae Koch, and the predacious stigmaeid mite, Zetzellia mali (Ewing) as well as with applications of primicarb, dichlone, and metiram. Counts of T. pyri were reduced by higher total toxicity scores for fungicides and miticides. We conclude that prospects for biological control of European red mite are good if organophosphate-resistant T. pyri are released in uncolonized orchards, and if growers use a modified spray program to promote survival of T. pyri and apple rust mite. The program should include use of dichlone and captan to control apple scab, Venturia inaequalis (Cke.) Wint., primicarb, azinphosmethyl, or phosmet to control insects after bloom, and bacterial/pyrethroid mixtures rather than recommended rates of pyrethoids to control winter moth, Dperophtera brumata (L.), and leafrollers. Journal of economic entomology. Apr 1991. v. 84 (2). p. 570-580. Includes references. (NAL Call No.: DNAL 421 J822).

0665

Effect of rosy apple aphid and spirea aphid (Homoptera: Aphididae) on dry matter accumulation and carbohydrate concentration in young apple trees.
JEENAI. Varn, M. Pfeiffer, D.G. Lanham, Md. : Entomological Society of America. One-year-old apple trees grown in pots were artificially infested with either Dysaphis plantaginea (Passerini) or Aphis spiraecola Patch. Feeding by D. plantaginea on 22-53% of the leaves on the tree significantly reduced accumulation of dry weight in all portions of the trees during the first season's growth. At the 10-leaf stage of the second season, dry weights of trees infested with D. plantaginea during the previous year were still significantly lower than those of control trees. A spiraecola did not reduce the accumulation of dry weight by the young trees. Journal of economic entomology. Apr 1989. v. 82 (2). p. 565-569. Includes references. (NAL Call No.: DNAL 421 J822).

0666

Effect of spotted tentiform leafminer injury on ethylene production and ACC content in apple leaves.
HJHSA. Kappel, F. Proctor, J.T.A.; Murr, D.P. Alexandria, Va. : American Society for Horticultural Science. HortScience. June 1987. v. 22 (3). p. 469-471. Includes references. (NAL Call No.: DNAL SB1.H6).

0667

Effect of trap design, trap height, and habitat on the capture of sap beetles (Coleoptera: Nitidulidae) using whole-wheat bread dough.
JEENAI. Peng, C. Williams, R.N. Lanham, Md. : Entomological Society of America. Nine trap designs were compared for capturing sap beetles: Lindgren funnel, Multi-Pher I, Skalbeck, Unitrap, Japanese beetle, liquid, water pan, cone, and McPhail. The Lindgren funnel was most effective for Glischrochilus fasciatus (Olivier) and G. quadrisignatus (Say). The Lindgren funnel, Multi-Pher, Skalbeck, moth, and liquid trap all caught equal numbers of Carpophilus lugubris Murray. The Skalbeck is recommended because of its low cost. G. fasciatus, G. quadrisignatus, and C. lugubris flew to higher traps in apple orchards than in open grassy areas. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1515-1519. Includes references. (NAL Call No.: DNAL 421 J822).

0668

Effect of tree fruit species on residual activity of avermectin B1 to Tetranychus urticae and Panonychus ulmi.
JEENAI. Beers, E.H. Hoyt, S.C.; Burts, E.C. Lanham, Md. : Entomological Society of America. Field-aged residues of avermectin B1 on apple and pear foliage were bioassayed at intervals for activity against two mite species, European red mite (Panonychus ulmi (Koch)) and twospotted spider mite (Tetranychus urticae Koch). Initial mortality was nearly 100% for both mite species on treated leaves of both tree species, and declined to 0-63% (1987) and 16-85% (1988) after 14 d. In both years, the mortality on treated apple foliage declined more quickly than that on pear. The main effect of tree species was significant at 1, 3, 7, and 14 d after treatment in 1987, and at 7 and 14 d after treatment in 1988. The main effect of mite species on mortality was not significant 3 d after treatment. Observed differences in field trial performance of avermectin B1 were apparently caused by differences inherent between apple and pear rather than the mite species that normally infest them. Journal of economic entomology. June 1990. v. 83 (3). p. 961-964. Includes references. (NAL Call No.: DNAL 421 J822).

0669

Effects and control of periodical cicada (Homoptera: Cicadidae) oviposition injury on nonbearing apple trees.
JEENAI. Hogmire, H.W. Baugher, T.A.; Crim, V.L.; Walter, S.I. Lanham, Md. : Entomological Society of America. Four netting and five insecticide treatments were evaluated for the protection of nonbearing apple trees from periodical cicada, Magicicada septendecim (L.), oviposition injury. A green, tubular, 1-cm-mesh netting excluded cicadas and was the most effective treatment. Netting of larger mesh sizes permitted entry and oviposition injury comparable with that observed on controls. Oxamyl, methomyl, and esfenvalerate were similar in providing excellent knockdown of cicadas; however, only treatment with esfenvalerate resulted in a significant reduction in oviposition injury. Tree height, tree volume, number of scaffold limbs per tree after pruning, and percentage of change in trunk cross-sectional area were significantly and negatively correlated with the number of oviposition scars per tree. When all costs associated with the use of insecticides for cicada control are considered, tubular netting is about 15% more expensive than chemical control with handgun sprayer at all tree densities, but cheaper than control with airblast sprayer at a tree density of 250 per ha. Journal of economic entomology. Dec 1990. v. 83 (6). p. 2401-2404. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0670

Effects of constant photoperiods and temperatures on the hibernating life stages of the San Jose scale (Homoptera: Diaspididae) in North Carolina.
JESCEP. Rock, G.C. McClain, D.C. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Oct 1990. v. 25 (4). p. 615-621. Includes references. (NAL Call No.: DNAL QL461.G4).

0671

Effects of experience on oviposition and attraction in Drosophila: comparing apples and oranges.
AMNTA. Hoffmann, A.A. Chicago, Ill. : University of Chicago Press. The American naturalist. July 1985. v. 126 (1). p. 41-51. Includes references. (NAL Call No.: DNAL 470 AM36).

0672

Effects of field applications of paraquat on densities of Panonychus ulmi (Koch) and Neoseiulus fallacis (Garman).
Pfeiffer, D.G. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. Oct 1986. v. 3 (4). p. 322-325. (NAL Call No.: DNAL SB599.J69).

0673

Effects of food, strain, and sex on estimating thermal requirements for nondiapause larval and pupal development of tufted apple bud moth (Lepidoptera: Tortricidae).
EVETEX. Mawby, W.D. Rock, G.C. College Park, Md. : Entomological Society of America. Environmental entomology. Feb 1986. v. 15 (1). p. 210-215. Includes references. (NAL Call No.: DNAL QL461.E532).

0674

The effects of ground cover manipulations on pest and predator mite populations on apple in Eastern New York.
NYFSB. Smith, G.D. Stiles, W.C.; Weires, R.W. Geneva, N.Y. : New York (State), Agricultural Experiment Station, Geneva. New York's food and life sciences bulletin. 1989. (128). 4 p. Includes references. (NAL Call No.: DNAL S95.E22).

0675

Effects of host plants on the toxicity of azinphosmethyl to susceptible and resistant light brown apple moth (Lepidoptera: Tortricidae).
JEENAI. Robertson, J.L. Armstrong, K.F.; Suckling, D.M.; Preisler, H.K. Lanham, Md. : Entomological Society of America. Responses of resistant and susceptible strains of light brown apple moth, Epiphyas postvittana (Walker), to azinphosmethyl varied significantly depending upon the diet that larvae consumed. Responses of resistant larvae reared on blackberry and susceptible larvae reared on artificial (general purpose) diet were similar. Susceptible larvae on artificial diet were significantly more tolerant compared with susceptible larvae fed any of the natural host plants, whereas resistant larvae reared on blackberry were significantly less resistant than resistant larvae reared on any other diet. Activity of nonspecific esterases of resistant larvae fed blackberry was significantly lower than activities in resistant larvae fed general purpose diet, gorse, apple, or broom, and not significantly different from nonspecific esterase activities of susceptible larvae reared on general purpose diet, gorse, apple, blackberry, or broom. In the presence of high glutathione S-transferase activity that characterized all resistant larvae regardless of diet, depressed nonspecific esterase activity may be responsible for increased toxicity of azinphosmethyl to resistant larvae on blackberry. In resistant strains of other polyphagous species, responses of individuals tested with pesticide may reflect metabolic effects related to the host plant rather than to the magnitude of genetically based resistance to the pesticide. Journal of economic entomology. Dec 1990. v. 83 (6). p. 2124-2129. Includes references. (NAL Call No.: DNAL 421 J822).

0676

Effects of pheromone trap design, placement, and pheromone dispenser and load on male Platynota flavedana and P. idaeusalis (Lepidoptera: Tortricidae) catches in Virginia apple orchards.
EVETEX. David, P.J. Horsburgh, R.L. Lanham, Md. : Entomological Society of America. The Pherocon 1C trap baited with a rubber septum impregnated with 2.5 mg pheromone captured the greatest number of Platynota flavedana Clemens moths. Traps hung at 2.1 and 3.0 m captured the greatest number of P. flavedana. Trap heights of 1.2, 2.1, and 3.0 m caught the greateest number of P. idaeusalis (Walker) moths. The outside-the-canopy trap position captured more P. flavedana moths, whereas the within-canopy trap location caught the greatest number of P. idaeusalis moths. Traps placed in the west portion of the tree captured the greatest number of P. flavedana moths. P. idaeusalis moth catches were not influenced by compass quadrants. Environmental entomology. Feb 1989. v. 18. p. 145-149. Includes references. (NAL Call No.: DNAL QL461.E532).

0677

Effects of tufted apple budmoth (Lepidoptera: Tortricidae) injury on quality and storageability of processing apples.
JEENAI. Hull, L.A. Rajotte, E.G. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1721-1736. Includes references. (NAL Call No.: DNAL 421 J822).

0678

Efficacy of formulated baits for control of Argentine ant (Hymenoptera: Formicidae).
JEENAI. Knight, R.L. Rust, M.K. Lanham, Md. : Entomological Society of America. We developed a laboratory method to determine the potential efficacy of baits formulated for control of the Argentine ant, Iridomyrmex humilis (Mayr). Possible effects as insect growth regulators were not examined. Of the 10 formulated baits tested, only mirex applied to granulated silkworm pupae had delayed toxicity. Hydramethylnon applied to granulated silkworm pupae also provided excellent kill of workers but did not exhibit delayed toxicity. In field tests, this bait provided faster control than did a chemical barrier of granular diazinon. Journal of economic entomology. Apr 1991. v. 84 (2). p. 510-514. Includes references. (NAL Call No.: DNAL 421 J822).

0679

Epigeal arthropods as predators of mature larvae and pupae of the apple maggot (Diptera: Tephritidae).
EVETEX. Allen, W.R. Hagley, E.A.C. Lanham, Md. : Entomological Society of America. Environmental entomology. Apr 1990. v. 19 (2). p. 309-312. Includes references. (NAL Call No.: DNAL QL461.E532).

0680

European earwigs (Dermaptera: Forficulidae) fail to control apple aphids on bearing apple trees and woolly apple aphids (Homoptera: Aphididae) in apple rootstock stool beds.
JEENAI. Carroll, D.P. Walker, J.T.S.; Hoyt, S.C. College Park, Md. : Entomological Society

of America. Journal of economic entomology. Aug 1985. v. 78 (4). p. 972-974. Includes references. (NAL Call No.: DNAL 421 J822).

0681

Evaluation of a methyl bromide quarantine treatment to control codling moth (Lepidoptera: Tortricidae) on nectarine cultivars proposed for export to Japan.
JEENAI. Yokoyama, V.Y. Miller, G.T.; Hartsell, P.L. Lanham, Md. : Entomological Society of America. Our experiments showed that testing required by regulatory agencies to demonstrate the efficacy of a quarantine treatment using 48 g/m3 methyl bromide for 2 h at 21 degrees C or above and 50% load was unnecessary to control codling moth, Cydia pomonella (L.), on every nectarine cultivar proposed for export to Japan. Ovipositional tests for codling moth on nine nectarine cultivars showed no differences in acceptability among cultivars that might cause higher populations in harvested fruit and affect quarantine security levels. Measurements of egg chorion and fruit cuticle showed that codling moth eggs were not affected by different nectarine cultivars and other fruit substrates. No differences that would reduce the efficacy of the methyl bromide quarantine treatment were found in codling moth mortality to methyl bromide fumigation in dose-response tests on different substrates, including nectarine, peach, plum, and apple cultivars and waxed paper. A confirmatory test resulted in 100% mortality of 27,174 1-d-old codling moth eggs. The true survival proportion based on all confirmatory tests was less than or equal to 20 per 1 million at the 95% CL. A concentration X time product of (average +/- SD) 68.0 +/- 3.0 g.h/m3 methyl bromide was considered a useful measurement to help maintain treatment security for control of codling moth on all nectarine cultivars. Journal of economic entomology. Apr 1990. v. 83 (2). p. 466-471. Includes references. (NAL Call No.: DNAL 421 J822).

0682

Evaluation of the tree-row-volume model for full-season pesticide application on apples.
PLDIDE. Sutton, T.B. Unrath, C.R. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1988. v. 72 (7). p. 629-632. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0683

Evidence for regional differences in the response of obliquebanded leafroller (Lepidoptera: Tortricidae) to sex pheromone blends.
EVETEX. Thomson, D.R. Angerilli, N.P.D.; Vincent, C.; Gaunce, A.P. Lanham, Md. : Entomological Society of America. Trap captures and species-specific responses (trap specificity) with four different blends composed of four components of synthetic western obliquebanded leafroller, Choristoneura rosaceana (Harris) (Lepidoptera: Tortricidae) sex pheromone were assessed in British Columbia, using seasonal trap catches of obliquebanded leafroller and the ratio of obliquebanded leafroller to Archips rosanus (L.) (Lepidoptera: Tortricidae). A four-component blend containing Z11-14:OAc, E11-14:OAc, Z11-14:ALD, and Z11-14:OH in a 100:2:1:0.75 ratio captured the greatest number of obliquebanded leafrollers and had a degree of trap specificity. In addition, differences in trap captures and the degree of trap specificity also were assessed for eastern (Quebec) and western (British Columbia) populations of obliquebanded leafroller. Comparisons were made using three different blends composed of either three or four components of the obliquebanded leafroller sex pheromone with the ratios 100:2:1:1.5, 100:5:0:5, and 100:2.5:0:2.5 of Z11-14:OAc, E11-14:OAc, Z11-14:ALD, and Z11-14:OH. In British Columbia, the four-component blend (100:2:1:1.5) captured the greatest number of obliquebanded leafrollers and had a high degree of trap specificity. In Quebec, no differences in trap captures among the blends were observed. These results suggest that qualitative differences may exist between the sex pheromone of eastern and western populations of obliquebanded leafroller and indicate the need for considering regional differences when monitoring obliquebanded leafroller with commercial synthetic pheromone blends. Environmental entomology. June 1991. v. 20 (3). p. 935-938. Includes references. (NAL Call No.: DNAL QL461.E532).

0684

Experiments on the release of a strain of the predatory mite Metaseiulus occidentalis Nesbitt resistant to organophosphorus preparations in Crimean agrocenoses (Pest of the red apple mite Panonychus ulmi).
Zil'bermints, I.V. Kuznetsov, N.N.; Petrushov, A.Z.; Fadeev, YU.N. New York, Allerton Press. Soviet agriculture sciences. 1978. 1978. (8). p. 18-20. ill. 5 ref. (NAL Call No.: S1.S68).

0685

Factors influencing release of host-marking pheromone by Rhagoletis pomonella flies.
JCECD. Averill, A.L. Prokopy, R.J. New York, N.Y. : Plenum Press. Journal of chemical ecology. Jan 1988. v. 14 (1). p. 95-111. ill. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0686

Fall migration, hibernation site selection, and associated winter mortality of plum curculio (Coleoptera: Curculionidae) in a Quebec Apple orchard.
JEENAI. Lafleur, G. Hill, S.B.; Vincent, C. Lanham, Md. : Entomological Society of America.

In fall, greater than 5,000 labeled (65Zn) adult plum curculio (PC), Conotrachelus nenuphar (Herbst), were released in two orchards, two woodlots, and 16 microplots in a plowed field. From orchards, most PC migrated toward high tree silhouettes at the edge of woodlots unless they occurred to the north. Most PC (83%) released within woodlots, with no directional differences in tree silhousette, migrated south. Migration was influenced by woodlots, with no directional differences in tree silhouette, migrated south. Migration was influenced by woodlot type and direction. Where woodlots had a thin litter layer, PC remained at the edge or returned to the orchard. In a field choice experiment, hibernating PC were recovered in thick litter (86%) and orchard turf (14%) plots, whereas none were found in gravel and thin litter layer plots. In field conditions, most PC hibernated within the litter layer; very few (less than 1%) penetrated the soil. Survival was related to preferred microhabitat type. Speed of dispersion was highest just after release in early September (3 m per insect per day) and close to zero by mid-October. Females dispersed further than males. A pathogenic fungus and bacterium were isolated from diseased PC. Nontarget organisms contaminated with 65Zn included spiders, slugs, earthworms, and birds. Implications for control and future research are discussed. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1152-1172. maps. Includes references. (NAL Call No.: DNAL 421 J822).

0687

Fall migration, hibernation site selection, and associated winter mortality of plum curculio (Coleoptera: Curculionidae) in a Quebec apple orchard.
JEENAI. Lafleur, G. Hill, S.B.; Vincent, C. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1152-1172. maps. Includes references. (NAL Call No.: DNAL 421 J822).

0688

Feeding behavior of pear psylla (Homoptera: Psyllidae) nymphs on susceptible and resistant Pyrus germplasm.
JEENAI. Butt, B.A. Stuart, L.C.; Bell, R.L. College Park, Md. : Entomological Society of America. In laboratory studies, pear psylla, Cacopsylla pyricola (Foerster), readily fed on 'Bartlett, 'Seckel,' and 'Monterrey' pear (Pyrus spp.).On known psylla-resistant genotypes, 'NY10352,' 'NY10355,' and 'Bradford,' psylla probed frequently and moved about, but either left the plant or died after little feeding. Results of these behavioral studies indicate that susceptible and resistant genotypes can be readily distinguished in a 24-h bioassay. Journal of economic entomology. Oct 1988. v. 81 (5). p. 1394-1397. Includes references. (NAL Call No.: DNAL 421 J822).

0689

Feeding behavior of the winter-form pear psylla, Psylla pyricola (Homoptera: Psyllidae), on reproductive and transitory host plants.
EVETEX. Ullman, D.E. McLean, D.L. College Park, Md. : Entomological Society of America. A comparison was made of the probing behavior of reproductively diapausing winter-form pear psylla, Psylla pyricola Foerster (Homoptera: Psyllidae), given access to leaves of Pyrus communis cv. Winter Nellis (pear, the sole reproductive host) and Prunus persica cv. Lovell (peach, a transitory host on which psylla do not reproduce). Winter-form pear psylla ingested predominantly from the phloem, xylem, and spongy parenchyma cells of pear and peach leaves. The elapsed time to first probe was significantly longer when insects were given access to peach than when given access to pear, yet the mean proportion of total probe time spent ingesting when various peach and pear leaf cell types were probed did not differ significantly, withthe exception of spongy parenchyma cells. These results suggest that preprobe stimuli mediate discrimination between reproductive and transitory host plants by winter-form psylla. The possible sensory mechanisms underlying host acceptance and discrimination between leaf cell types by winter-form pear psylla, as well as the epidemiological implications of these data for pear decline, are discussed. Environmental entomology. Aug 1988. v. 17 (4). p. 675-678. Includes references. (NAL Call No.: DNAL QL461.E532).

0690

Feeding by Medetera species (Diptera: dolichopodidae) on aphids and eriophyid mites on apple, Malus domestica (Rosaceae).
PESWA. Rathman, R.J. Brunner, J.F.; Hulbert, S.J. Washington, D.C. : The Society. Proceedings of the Entomological Society of Washington. Oct. 1988. v. 90 (4). p. 510-512. ill. (NAL Call No.: DNAL 420 W27).

0691

Feeding, longevity, and development of pear psylla (Homoptera: Psyllidae) nymphs on resistant and susceptible pear genotypes.
JEENAI. Butt, B.A. Stuart, L.C.; Bell, R.L. Lanham, Md. : Entomological Society of America. One-day-old first-instar pear psylla, Cacopsylla pyricola Foerster, were placed on 'Bartlett' (susceptible), NY10352 (moderately resistant), and 'Bradford' (resistant) pear (Pyrus spp.) genotypes. Psylla nymphs fed and developed readily on 'Bartlett' but fed little, developed slowly, and did not reach the fifth stadium on 'Bradford.' Psylla feeding on NY10352 resulted in an extremely extended development time, with very few reaching the adult stage. Journal of economic entomology. Apr 1989. v. 82 (2). p. 458-461. Includes references. (NAL Call No.: DNAL 421 J822).

0692

Fenoxycarb and diapause: a possible method of control for pear psylla (Homoptera: Psyllidae).
JEENAI. Krysan, J.L. Lanham, Md. : Entomological Society of America. That analogs or mimics of insect juvenile hormones could be used to control insects by disrupting their diapause, thus uncoupling the target insects from the seasonal cycles of their environment, was once considered a promising possibility for insect management. The animals would die during an inimical period because survival mechanisms are lacking. However, laboratory studies revealed no promising model system and the concept languished. I found that the reproductive diapause of pear psylla, Cacopsylla pyricola (Foerster) (Homoptera: Psyllidae), was terminated by topical application of as little as 1 ng per insect of fenoxycarb, a carbamate that mimics juvenile hormone. Seasonally inappropriate ovarian development and mating began when fenoxycarb was applied to the foliage upon which adults fed and rested. The same effect was shown in field tests. Disruption of diapause with juvenoids may still be a viable strategy for insect pest management. Journal of economic entomology. Apr 1990. v. 83 (2). p. 293-299. Includes references. (NAL Call No.: DNAL 421 J822).

0693

Field survey and laboratory evaluation of the predator complex of Lygus lineolaris and Lygocoris communis (Hemiptera: Miridae) in apple orchards.
JEENAI. Arnoldi, D. Stewart, R.K.; Boivin, G. Lanham, Md. : Entomological Society of America. The predator complex of the tarnished plant bug, Lygus lineolaris (Palisot de Beauvois), and Lygocoris communis (Knight) in an apple orchard was determined by screening 30 potential predators. Laboratory feeding trials and field monitoring were conducted for six predatory arthropods that displayed >60% incidence of predation: Nabicula subcoleoptrata Kirby (Hemiptera: Nabidae), Zelus socius Stal (Hemiptera: Reduviidae), Podisus maculiventris Say (Hemiptera: Pentatomidae), Phymata pennsylvanica Handlirsch (Hemiptera: Phymatidae), Philodromus praelustris Keyserling (Araneidae: Philodromidae), and Xysticus punctatus Keyserling (Araneidae: Thomisidae). Daily consumption rates of Z. socius, P. pennsylvanica, N. subcoleoptrata, and P. maculiventris were two to three L. lineolaris adults, whereas Z. socius and P. maculiventris killed one to two adult L. communis. These predators are all generalist feeders. P. maculiventris was the only predator present with L. lineolaris in May on apple trees. Journal of economic entomology. June 1991. v. 84 (3). p. 830-836. Includes references. (NAL Call No.: DNAL 421 J822).

0694

Fitness and immigration: factors affecting reversion of organotin resistance in the twospotted spider mite (Acari: Tetranychidae).
JEENAI. Flexner, J.L. Theiling, K.M.; Croft, B.A.; Westigard, P.H. Lanham, Md. : Entomological Society of America. Reversion of resistance to the organotin acaricide cyhexatin was documented for the twospotted spider mite, Tetranychus urticae (Koch), by laboratory isolation of a field-resistant colony collected from Oregon pears in May 1983. Fitness studies were conducted in 1985 and 1986 on susceptible and resistant colonies of T. urticae. Susceptible colonies had significantly shorter developmental times and higher percentage survival (egg to adult) than resistant colonies. Fitness differences appeared to influence resistance reversion in the laboratory. The effect of immigration on organotin resistance also was investigated. A laboratory immigration dilution experiment revealed that dilution of resistance at a rate of 1:100 and 1:10 (susceptible/resistant mites) allowed a moderately resistant colony to revert to susceptibility in approximately three generations. After six generations, a resistant check colony also had reverted to susceptibility. These data suggest that both fitness and immigration may affect reversion of organotin resistance in populations of T. urticae from southern Oregon pears. Journal of economic entomology. Aug 1989. v. 82 (4). p. 996-1002. Includes references. (NAL Call No.: DNAL 421 J822).

0695

Five years research and experience with control of the dogwood borer and related burr knot problems.
CFRTA. Weires, R. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. 1986. v. 19. p. 86-89. Includes references. (NAL Call No.: DNAL 93.5 D96).

0696

Flatheaded apple tree borer (Coleoptera: Buprestidae) in nursery-grown red maples: phenology of emergence, treatment timing, and response to stressed trees.
Potter, D.A. Timmons, G.M.; Gordon, F.C. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1988. v. 6 (1). p. 18-22. Includes references. (NAL Call No.: DNAL SB1.J66).

0697

Flight period and seasonal development of the apple maggot, Rhagoletis pomonella (Walsh) (Diptera: Tephritidae), in Oregon.
AESAAI. Aliniazee, M.T. Westcott, R.L. College Park, Md. : The Society. Annals of the Entomological Society of America. Nov 1987. v. 80 (6). p. 823-828. Includes references. (NAL Call No.: DNAL 420 EN82).

0698

Foliar persistence and effect of fenoxycarb on Platynota idaeusalis (Lepidoptera: Tortricidae) on apple.
JEENAI. Hull, L.A. Barrett, B.A.; Fajotte, E.G. Lanham, Md. : Entomological Society of America. Bioassays were conducted to examine the residual activity of the insect growth regulator fenoxycarb, at two rates (20 and 40 ppm), against eggs and late instars of the tufted apple bud moth, Platynota idaeusalis (Walker). Both rates of fenoxycarb showed very good larvicidal activity 3-4 wk after application. Fenoxycarb had no effect on P. idaeusalis eggs. Field trials conducted over 2 yr showed that fenoxycarb provided control of P. idaeusalis equivalent to conventional insecticides, but with fewer applications. Fenoxycarb did not affect integrated mite control, but indirect evidence suggested a possible detrimental effect on immatures of Stethorus punctum (LeConte). Journal of economic entomology. June 1991. v. 84 (3). p. 965-970. Includes references. (NAL Call No.: DNAL 421 J822).

0699

For the Utah apple maggot, a name change might be in order.
UTSCB. Alston, D. Messina, F. Logan, Utah : The Station. Utah Science - Utah Agricultural Experiment Station. Summer 1990. v. 51 (2). p. 90-91. ill. (NAL Call No.: DNAL 100 UT1F).

0700

Fruit-acceptance pattern of Rhagoletis pomonella (Diptera: tephritidae) flies from different geographic regions.
AESAAI. Prokopy, R.J. Kallet, C.; Cooley, S.S. College Park, Md. : The Society. Annals of the Entomological Society of America. Nov 1985. v. 78 (6). p. 799-803. Includes references. (NAL Call No.: DNAL 420 EN82).

0701

Functional response of Orius insidiosus (Hemiptera: Anthocoridae) to the European red mite, Panonychus ulmi (Acari: Tetranychidae), at different constant temperatures.
EVETEX. McCaffrey, J.P. Horsburgh, R.L. College Park, Md. : Entomological Society of America. Environmental entomology. June 1986. v. 15 (3). p. 532-535. Includes references. (NAL Call No.: DNAL QL461.E532).

0702

Gamma irradiation as a quarantine treatment for apples infested by codling moth (Lepidoptera: Tortricidae).
JEENAI. Burditt, A.K. Jr. Hungate, F.P. Lanham, Md. : Entomological Society of America. Codling moth, Cydia pomonella (L.) larvae reared on thinning apples were exposed to gamma radiation at incremental doses up to 138 Gy (gray). Adult emergence from pupae was reduced, and larval mortality increased as dose increased. At a dose of 39.2 Gy, emergence of normal adults from irradiated younger larvae (first through third instars) was reduced, and emergence of physically deformed adults increased. At higher doses, adult emergence was further reduced, the ratio of male to female emergence increased significantly, and overall survival of larvae declined. Similar results were obtained for older larvae (third through fifth instars) except that tbe doses required for comparable effects were 10-25% higher than those for younger larvae. These data suggest that doses of 372 Gy would prevent first through third instars from maturing and forming cocoons. However, probit analysis showed that a dose of 187 Gy or less gave quarantine security based on preventing adult emergence from fruit infested by larvae. When an estimated 79,540 nondiapausing immature larvae infesting thinning apples were exposed to approximately 153 Gy, only 15,501 formed cocoons; of these, only 256 pupated and none emerged as adults. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1386-1390. Includes references. (NAL Call No.: DNAL 421 J822).

0703

Gas exchange characteristics of apple and peach leaves infested by European red mite and twospotted spider mite.
JOSHB. Mobley, K.N. Marini, R.P. Alexandria, Va. : The Society. Greenhouse-grown 'Imperial Delicious' apple (Malus domestica Borkh.) and 'Redhaven' peach (Prunus persica Batsch.) trees were inoculated during the summer with three densities of European red mite (ERM) (Panonychus ulmi Koch) and twospotted spider mite (TSM) (Tetranychus urticae Koch). As ERM- and TSM-days increased, net photosynthesis (Pn), transpiration (Tr), and total chlorophyll content (TCHL) of apple leaves decreased linearly. At similar densities, TSM was more damaging than ERM to apple leaf gas exchange. Water-use efficiency (WUE) of apple declined similarly with increasing mite-days for both mite species. Specific leaf weight (SLW) of apple increased with TSM-days. Pn, Tr, TCHL, and WUE of peach declined linearly with increasing ERM- and TSM-days, and the rates of decline were similar for both mite species. Mites did not affect peach SLW. These results indicate that greenhouse-grown peach is more tolerant than apple to mite feeding. Journal of

the American Society for Horticultural Science. Sept 1990. v. 115 (5). p. 757-761. Includes references. (NAL Call No.: DNAL 81 S012).

0704

Genetic analysis of dicofol resistance in two populations of twospotted spider mite (Acari: Tetranychidae) from New York apple orchards.
JEENAI. Rizzieri, D.A. Dennehy, T.J.; Glover, T.J. College Park, Md. : Entomological Society of America. The genetics of dicofol resistance in two populations of Tetranychus urticae (Koch) (Cohn R1 and Lamont R2) was studied. In both populations, the inheritance of resistance was consistent with the hypothesis of control by one major, incompletely recessive gene. No extranuclear effects were found but one minor modifying factors appeared to be involved. An allelism study of the R1 and R2 populations revealed that the gene conferring resistance resides at the same locus in each resistant culture, or at two very closely linked loci. Journal of economic entomology. Oct 1988. v. 81 (5). p. 1271-1276. Includes references. (NAL Call No.: DNAL 421 J822).

0705

Genetic structure of apple maggot fly (Diptera: Tephritidae) populations.
AESAAI. McPheron, B.A. Lanham, Md. : The Society. Annals of the Entomological Society of America. May 1990. v. 83 (3). p. 568-577. maps. Includes references. (NAL Call No.: DNAL 420 EN82).

0706

The geographic pattern of genetic differentiation between host associated populations of Rhagoletis pomonella (Diptera: Tephritidae) in the eastern United States and Canada.
EVOLA. Feder, J.L. Chilcote, C.A.; Bush, G.L. Lawrence, Kan. : Society for the Study of Evolution. Evolution. May 1990. v. 44 (3). p. 570-594. maps. Includes references. (NAL Call No.: DNAL 443.8 EV62).

0707

The grape mealybug on pear.
PWHAA. Beers, E.H. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 193-195. (NAL Call No.: DNAL 81 W273).

0708

Greenhouse study of the effects of three early-season pests on 19 apple selections.
JEENAI. Goonewardene, H.F. Kwolek, W.F. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1985. v. 78 (2). p. 366-370. Includes 10 references. (NAL Call No.: DNAL 421 J822).

0709

Growing conditions influence mite damage on apple and peach leaves.
HJHSA. Campbell, R.J. Mobley, K.N.; Marini, R.P. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1990. v. 25 (4). p. 445-448. Includes references. (NAL Call No.: DNAL SB1.H6).

0710

Growth reduction in nonbearing apple trees by woolly apple aphids (Homoptera: Aphididae) on roots.
JEENAI. Brown, M.W. Schmitt, J.J. Lanham, Md. : Entomological Society of America. The effect of root-feeding populations of woolly apple aphids, Eriosoma lanigerum (Hausmann), on newly planted, nonbearing apple trees in an orchard environment was studied. Roots of two-thirds of the 351 'Red Delicious' study trees were artificially infested with woolly apple aphids from a laboratory colony in 1986, 1 mo after planting. The artificial infestation resulted in 95% of the trees being infested (including controls), but did not produce more severe root infestations per tree than expected in natural infestations. The root infestation rating (mean = 0.35 on a scale of 0-1, SEM = 0.18) determined from destructive sampling of one-third of the orchard after three growing seasons was not correlated with population density above ground throughout the 3 yr of the study. Root feeding marginally reduced branch growth in the first and third year after infestation, crown length in the third year, and trunk diameter in the first and second years. Crown length was significantly reduced after 1 yr and trunk diameter was significantly reduced after 3 yr because of woolly apple aphid feeding on roots. Scion biomass also was significantly reduced by woolly apple aphid root feeding after 3 yr. We conclude that woolly apple aphid populations on roots have a slight, but significant, negative effect on growth of young nonbearing apple trees in the orchard environment. We also conclude that, because of the lack of correlation between woolly apple aphid populations aboveground and on roots, sampling branch terminals and pruning scars yields no information on the density of woolly apple aphids on roots. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1526-1530. Includes references. (NAL Call No.: DNAL 421 J822).

0711

Head capsule widths as an indicator of the larval instar of codling moth (Lepidoptera: Olethreutidae).
GRLEA. Weitzner, P. Whalon, M.E. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Autumn 1987. v. 20 (3). p. 147-150. Includes references. (NAL Call No.: DNAL QL461.M5).

0712

Hexythiazox resistance in a field population of European red mite (Acari: Tetranychidae) on apples.
JEENAI. Reissig, W.H. Hull, L.A. Lanham, Md. : Entomological Society of America. Laboratory and field tests conducted from 1985 to 1989 demonstrated that a population of European red mite, Panonychus ulmi (Koch), in an apple orchard in Pennsylvania had become highly resistant to hexythiazox, a relatively new acaricide that is not registered for use on apples in the United States. A total of 20 treatments of hexythiazox had been applied to four different randomly selected trees throughout this 0.6-ha orchard during June and July from 1983 to 1986. Each year, 4-20 randomly selected trees were treated with two to five sprays of hexythiazox. In laboratory bioassays conducted in 1988 and 1989, mortality of overwintering eggs, summer eggs, and larvae averaged <40% at concentrations of hexythiazox ranging from 32 to 10,000 ppm (AI). In contrast, >98% of these life stages of mites from a susceptible population of mites collected from a research orchard in New York were killed at hexythiazox concentrations of > 100 ppm (AI) in laboratory tests. The mites from both the New York and Pennsylvania populations were susceptible in laboratory bioassays to clofentezine (another new, chemically unrelated miticide which is also primarily active against mite eggs and larvae) despite the fact that 12 sprays of clofentezine were applied to the Pennsylvania population from 1981 to 1986. Journal of economic entomology. June 1991. v. 84 (3). p. 727-735. Includes references. (NAL Call No.: DNAL 421 J822).

0713

Honey bee (Hymenoptera: Apidae) foraging during bloom in dimethoate-treated apple orchards.
JEENAI. Danka, R.G. Collison, C.H.; Hull, L.A. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1985. v. 78 (5). p. 1042-1047. Includes references. (NAL Call No.: DNAL 421 J822).

0714

Host acceptance behavior of pear psylla (Homoptera: Psyllidae) affected by plant species, host deprivation, habituation, and eggload.
AESAAI. Horton, D.R. Krysan, J.L. Lanham, Md. : The Society. Annals of the Entomological Society of America. Nov 1991. v. 84 (6). p. 612-627. Includes references. (NAL Call No.: DNAL 420 EN82).

0715

Host-selection behavior differences between the fruit fly sibling species Rhagoletis pomonella and Rhagoletis mendax (Diptera: Tephritidae).
AESAAI. Diehl, S.R. Prokopy, R.J. College Park, Md. : The Society. Annals of the Entomological Society of America. Jan 1986. v. 79 (1). p. 266-271. Includes references. (NAL Call No.: DNAL 420 EN82).

0716

Host shifts of Chymomyza amoena (Diptera: Drosophilidae).
AMNAA. Band, H.T. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. July 1988. v. 120 (1). p. 163-182. Includes references. (NAL Call No.: DNAL 410 M58).

0717

Host status of the apple maggot (Diptera: Tephritidae) in Colorado.
JEENAI. Kroening, M.K. Kondratieff, B.C.; Nelson, E.E. Lanham, Md. : Entomological Society of America. The apple maggot, Rhagoletis pomonella (Walsh), is present throughout the major commercial fruit-growing counties (Mesa and Delta) of Colorado. A trapping program was initiated in 1987 to evaluate the host status of the apple maggot in Colorado and to compare the efficacy of the various trap types. No apple maggot adults were trapped in commercial apple orchard locations. Trap catches were low in abandoned apple orchard locations compared with trap catches in adjacent native hawthorn, Crataegus rivularis Nutt. No larvae or pupae were obtained from apple fruit collected from unsprayed abandoned orchards. At this time, it appears that the apple maggot has not successfully expanded its host range to include apples in Colorado. Red spheres baited with butyl hexanoate did not trap more apple maggot adults than Pherocon AM traps in July, but baited spheres trapped more adults than Pherocon AM traps in the months of August and September. Red baited spheres did not trap more adults than red unbaited spheres throughout the entire season. Journal of economic entomology. June 1989. v. 82 (3). p. 886-890. Includes references. (NAL Call No.: DNAL 421 J822).

0718

Hosts and habitats of parasitoids (Hymenoptera: Aphidiidae) implicated in biological control of apple aphid (Homoptera: Aphididae).
EVETEX. Carroll, D.P. Hoyt, S.C. College Park, Md. : Entomological Society of America. Environmental entomology. Dec 1986. v. 15 (6). p. 1171-1178. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

0719

IMP 1991 commercial apple: insect, disease, and weed control recommendations.
Patterson, M.G. Everest, J.W. Auburn, Ala. : The Service. Circular ANR - Alabama Cooperative Extension Service, Auburn University. In subseries: Integrated Pest Management. Dec 1990. (11). 11 p. (NAL Call No.: DNAL S544.3.A2C47).

0720

Impact of woolly apple aphid (Homoptera: Aphididae) on the growth of potted apple trees.
JEENAI. Weber, D.C. Brown, M.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1988. v. 81 (4). p. 1170-1177. Includes references. (NAL Call No.: DNAL 421 J822).

0721

Impacts of the University of Connecticut integrated pest management program for apples 1984-1987 /prepared by: Roger G. Adams, Lorraine M. Los.
Adams, Roger G. Los, Lorraine M. Connecticut : Cooperative Extension System, University of Connecticut, College of Agriculture and Natural Resources, 1990? . Cover title.~ "90-22.". 24 p. : ill. ; 28 cm. (NAL Call No.: DNAL SB608.A6A33 1990).

0722

Incidence of spirea aphid (Homoptera: Aphididae) in apple orchards in Virginia, West Virginia, and Maryland.
JESCEP. Pfeiffer, D.G. Brown, M.W.; Varn, M.W. Tifton, Ga. : The Entomological Science Society. Journal of entomological science. Jan 1989. v. 24 (1). p. 145-149. Includes references. (NAL Call No.: DNAL QL461.G4).

0723

Incorporating fruit set estimates with thrips management to create a decision support system for apples.
HJHSA. DeGrandi-Hoffman, G. Terry, I.; Huber, R.T. Alexandria, Va. : American Society for Horticultural Science. HortScience. June 1988. v. 23 (3). p. 571-574. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

0724

Indiana commercial tree fruit spray schedules 1986 / prepared by David L. Matthew ... et al. .
Matthew, David L. West Lafayette, IN : Cooperative Extension Service, Purdue University, 1986? . Abstract: This guide for commercial tree fruit growers includes 1986 Indiana tree fruit spray schedules and pesticide recommendations for apple, peach, cherry, pear and plum crops. It provides information on mite, mouse and weed control, growth regulators, chemical thinning, pesticide handling, safety, and Integrated Pest Management (IPM). 37 p. ; 28 cm. (NAL Call No.: DNAL 275.29 In2Id no.168).

0725

Industry involvement a must!.
WEFGA. Klassen, P. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Apr 1987. v. 107 (4). p. 56F-56G. (NAL Call No.: DNAL 80 G85W).

0726

Infestation of rootstocks by woolly apple aphid on weak or dead apple trees in North Carolina orchards.
Klimstra, D.E. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. July 1985. v. 2 (3). p. 309-312. Includes references. (NAL Call No.: DNAL SB599.J69).

0727

Influence of food, age, and mating on production of fertile eggs by Japanese beetles (Coleoptera: Scarabaeidae).
JEENAI. Ladd, T.L. Jr. College Park, Md. : Entomological Society of America. Journal of economic entomology. Feb 1987. v. 80 (1). p. 93-95. Includes references. (NAL Call No.: DNAL 421 J822).

0728

Influence of food on development, survival, Fecundity, longevity, and sex ratio of Glischrochilus quadrisgnatus (Coleoptera: Nitidulidae).
EVETEX. Peng, C.W. Williams, R.N. Lanham, Md. : Entomological Society of America. Food source had a significant effect on development time of Glischrochilus quadrisignatus (Say) from neonate larva to adult, with the shortest mean developmental time of 41.2 d on multiple-species rearing diet (MSRD) and longest mean of 63.4 d on sap beetle diet

(SBD). Pupae that developed on MSRD were heaviest, followed by those on SBD, apple (Malus domestica Borkh), and tomato (Lycopersicon esculentum Mill.). Percentage survival from neonate larva to adult differed significantly among food sources. Survival to adult was highest on MSRD. Females fed on MSRD, SBD, and apple produced significantly more eggs than on tomato. Beetles survived significantly longer on MSRD and apple than on SBD. Highest mortality occurred on tomato. The adult sex ratio on both artificial diets conformed to a 1:1 ratio. However, on natural foods, males were significantly more abundant than females. G. quadrisignatus reared on any food resulted in population increases of from 20.0- to 71.3-fold after each generation. MSRD proved to be the most suitable food for rearing G. quadrisignatus. Environmental entomology. Feb 1991. v. 20 (1). p. 205-210. Includes references. (NAL Call No.: DNAL QL461.E532).

0729

The influence of native habitat on arthropods colonizing apple: an overview.
WSEPA. Rathman, R.J. Pullman, Wash. : The Society. Proceedings of the Washington State Entomological Society. Meeting held on April 23 and September 17, 1988, Yakima, Washington. 1988. (50). p. 864-865. (NAL Call No.: DNAL QL461.W3).

0730

Influence of temperature on the ovipositional biology of the redbanded leafroller and tufted apple bud moth (Lepidoptera: Tortricidae).
JESCEP. Rock, G.C. Stinner, R.E. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Apr 1990. v. 25 (2). p. 277-283. Includes references. (NAL Call No.: DNAL QL461.G4).

0731

Influence of trap color and San Jose scale (Homoptera: Diaspididae) pheromone on sticky trap catches of 10 aphelinid parasitoids (Hymenoptera).
EVETEX. McClain, D.C. Rock, G.C.; Woolley, J.B. Lanham, Md. : Entomological Society of America. The influence of trap color and a combination of trap color plus San Jose scale, Quadraspidiotus perniciosus (Comstock), sex pheromone on sticky trap catches of aphelinid parasitoids of the San Jose scale was studied in an unsprayed apple orchard in Johnston County, N.C., in 1986 and 1987, and a sprayed commercial peach orchard in Nash County, N.C., in 1987. The responses of parasitoids to five enamel paints were compared in 1986, and similar responses to three enamel paints with and without the San Jose scale pheromone were compared in 1987. The adult parasitoids (3,958 total) collected on the traps represented ten aphelinid species. Ablerus clisiocampae (Ashmead), Aphytis diaspidis (Howard), Encarsia sp., A. melanostictus Compere, Coccobius sp., Coccophagoides murtfeldtae (Howard), E. aurantii (Howard), E. perniciosi (Tower), Marietta carnesi (Howard), and M. mexicana (Howard). Black traps attracted significantly more C. murtfeldtae and Encarsia sp. (endoparasitic species) than did other colors, suggesting a response to the contrast between the bark and foliage of the tree. Yellow and black traps attracted significantly more A. diaspidis, an ectoparasitic species, than white traps at both orchards in 1987. Colored traps baited with San Jose scale pheromone attracted significantly more E. perniciosi, an endoparasitic species, than colored traps without San Jose scale pheromone. This indicates that San Jose scale pheromone is a kairomone for the parasitoid. In comparisons with colored traps baited with pheromone, black traps attracted significantly more E. perniciosi than did yellow or white traps in the unsprayed apple orchard in 1987. This suggests an interaction between olfactory and visual cues in host location by this species. Environmental entomology. Aug 1990. v. 19 (4). p. 926-931. Includes references. (NAL Call No.: DNAL QL461.E532).

0732

Inhibition of aggregation behavior in the green June beetle (Coleoptera: Scarabaeidae) by antibiotic treatment of food substrate.
EVETEX. Domek, J.M. Johnson, D.T. Lanham, Md. : Entomological Society of America. A trapping study using a Latin-cube design was conducted in an apple variety block in 1987 to determine the effect of microorganisms on the attraction of green June beetles Cotinis nitida (L.) (Coleoptera: Scarabaeidae) to fruit. Baffle and funnel traps baited with male beetles fed nystatin-treated peach puree diet caught significantly fewer beetles than beetles fed untreated peach puree, streptomycin-penicillin-treated puree, streptomycin-penicillin-nystatin-treated puree, 20% untreated glucose diet, and beetles caged with diet but prevented from feeding ($P < 0.05$). In 1988 a study was conducted in a vineyard using the same traps and a similar experimental design. Traps baited with beetles fed nystatin-treated diet caught significantly fewer beetles than traps baited with beetles fed untreated puree and beetles caged with untreated puree but prevented from feeding. Traps baited with beetles fed untreated puree again caught significantly more beetles than all other treatments ($P < 0.05$). These results suggest that yeasts contained in diet, and possibly in beetle digestive tracts, contributed significantly to the production of volatiles, which induce beetle aggregations on fruit. Environmental entomology. Aug 1990. v. 19 (4). p. 995-1000. Includes references. (NAL Call No.: DNAL QL461.E532).

0733

Insect answers: Apple-and-thorn skeletonizer.
WUEXA. Suomi, D. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. July 1986. (1384). 2 p. ill. (NAL Call No.: DNAL 275.29 W27P).

0734

Insect answers: Pear slug.
WUEXA. Antonelli, A. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Mar 1986. (1369). 2 p. ill. (NAL Call No.: DNAL 275.29 W27P).

0735

Insect answers: The codling moth.
WUEXA. Retan, A.H. Pullman, Wash. : The Service. Extension Bulletin - Washington State University, Cooperative Extension Service. May 1985. (1264,rev.). 2 p. ill. Includes 1 references. (NAL Call No.: DNAL 275.29 W27P).

0736

Insecticide resistance in spotted tentiform leafminer (Lepidoptera: Gracillariidae): mechanisms and management.
JEENAI. Pree, D.J. Archibald, D.E.; Cole, K.J. Lanham, Md. : Entomological Society of America. Resistance to organophosphorous insecticides, pyrethroids, and methomyl occurred in populations of spotted tentiform leafminer, Phyllonorycter blancardella (F.), from southern Ontario. Resistance to organophosphorous insecticides occurred in all populations from commercial orchards. Resistance appeared to be due to an insensitive target acetylcholinesterase (AChE). Addition of several types of synergists to azinphosmethyl solutions did not affect toxicity. Resistance to methomyl appeared to be partially due to enhanced metabolism by aliesterases and partially to reduced inhibition of AChE. Selection for methomyl resistance was separate from resistance to organophosphorous insecticides. Increased activity of glutathione S-transferases was not implicated in resistance to either organophosphorous insecticides or methomyl. With current pest control practices, management of resistance to organophosphorous insecticides is not feasible in Ontario apple orchards. Resistant populations are regularly subjected to selection pressure by organophosphorous insecticides applied for control of other orchard pests. Pyrethroid resistance has been managed by modifications in the timing of applications to coincide with a predominance of the most sensitive life stages. Use of this strategy over three seasons has not resulted in detectably higher levels of resistance. Resistance to methomyl was relatively rare compared with organophosphorous or pyrethroid resistance. Methomyl resistance could be managed by strategies similar to those used for pyrethroids, i.e., modification of spray timing to coincide with the presence of early larval stages, or by restricted use. Where use was restricted for 3 yr after resistance was detected, resistance to methomyl declined from 9-fold to approximately 4.5-fold. Journal of economic entomology. June 1990. v. 83 (3). p. 678-685. Includes references. (NAL Call No.: DNAL 421 J822).

0737

Insecticides.
MUCBA. Howitt, A.J. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In series analytic: 1989 fruit spraying calendar / edited by A.L. Jones, A.J. Howitt, and J. Hull. Nov 1988. (154). p. 9-13. (NAL Call No.: DNAL 275.29 M58B).

0738

Insects associated with apple in the mid-Atlantic states.
NYFSB. Brown, M.W. Adler, C.R.L.; Weires, R.W. Geneva, N.Y. : New York (State), Agricultural Experiment Station, Geneva. New York's food and life sciences bulletin. 1988. (124). 31 p. ill. Includes references. (NAL Call No.: DNAL S95.E22).

0739

Integrated mite control in New York apple orchards.
Nyrop, J. Batavia, N.Y. : Agricultural Div. of Coop Extension, Four Western Plain Counties, N.Y. State. Ag impact. Apr 1987. p. 10, 12. ill. (NAL Call No.: DNAL S544.3.N7A45).

0740

Integration of biological and chemical control tactics for apple pests through selective timing and choice of synthetic pyrethroid insecticides.
JEENAI. Hull, L.A. Beers, E.H.; Meagher, R.L. Jr. College Park, Md. : Entomological Society of America. Journal of economic entomology. June 1985. v. 78 (3). p. 715-721. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0741

Interaction of weeds and apple pests.
NEMFA. Coli, W.M. Ciurlino, R. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 52-58. (NAL Call No.: DNAL 81 M384).

0742

Investigations into the biochemical basis of azinphosmethyl resistance in the light brown apple moth, Epiphyas postvittana (Lepidoptera: Tortricidae).
PCBPB. Armstrong, K.F. Suckling, D.M. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. Sept 1988. v. 32 (1). p. 62-73. ill. Includes references. (NAL Call No.: DNAL SB951.P49).

0743

Labeling tufted apple bud moth (Lepidoptera: Tortricidae) with rubidium: effect on development, longevity, and fecundity.
AESAAI. Knight, A.L. Hull, L.A.; Rajotte, E.G.; Fleischer, S.J. Lanham, Md. : The Society. Annals of the Entomological Society of America. July 1989. v. 82 (4). p. 481-485. Includes references. (NAL Call No.: DNAL 420 EN82).

0744

Laboratory and field studies of resistance of crab apple clones to Rhagoletis pomonella (Diptera: Tephritidae).
EVETEX. Reissig, W.H. Brown, S.K.; Lamb, R.C.; Cummins, J.N. Lanham, Md. : Entomological Society of America. Oviposition and larval survival of Rhagoletis pomonella (Walsh) varied significantly among fruit from 25 crab apple species and clones evaluated in field and laboratory studies. In general, the relative oviposition preference and larval survival was similar in fruit infested naturally in the field and fruit tested in the laboratory. Flies oviposited more in clones with larger fruit, although this relationship was more pronounced in laboratory tests when fruit was infested by laboratory-reared flies than in fruit infested in the field by wild flies Aldenhamensis,' Fuji,' Vilmorin,' Malus zumi calocarpa Rehd., and M. hupehensis (Pamp) Rehd. fruit was not infested in the field, but flies oviposited in fruit of all 25 species and clones in choice tests in the laboratory. Eggs hatched but larvae did not survive in fruit of Henry F. DuPont,' Frettingham,' Fuji,' Sparkler,' M. hupehensis, and M. zumi calocarpa. Larval mortality was very high in fruit from Vilmorin,' Sparkler,' NA 40298,' Henrietta Crosby,' Golden Gem,' Almey,' M. baccata L. (Borkh.), and M. sikkimensis (Hook.) Koehne. Environmental entomology. June 1990. v. 19 (3). p. 565-572. Includes references. (NAL Call No.: DNAL QL461.E532).

0745

Laboratory methods for rearing spotted tentiform leafminer (Lepidoptera: Gracillariidae) and two of its parasitoids.
JEENAI. Ridgway, N.M. Mahr, D.L. Lanham, Md. : Entomological Society of America. Methods are described for rearing spotted tentiform leafminer, Phyllonorycter blancardella (F.) (Lepidoptera: Gracillariidar), and two of its parasitoids, Pholetesor ornigis (Weed) (Hymenoptera: Braconidae) and Sympiesis marylandensis Girault (Hymenoptera: Eulophidae) in the laboratory. One-year-old Malus domestica Borkh. 'Malling 7' clonal rootstocks were grown in a greenhouse and then infested with leafminers. Trees were held at 23 degrees C in a controlled-temperature chamber until larvae reached the desired stages for parasitoid oviposition. Time from leafminer oviposition to first, second, third, fourth, and fifth instar larva was 7, 10, 13, 15, and 18 d, respectively. Development time from oviposition to adult emergence was 28.3, 20.5, and 9.6 d for males of Phyllonorycter blancardella, Pholetesor ornigis, and S. marylandensis. Development time for females was 29.1, 21.3, and 10.9 d, respectively. Journal of economic entomology. Feb 1989. v. 82 (1). p. 319-321. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0746

Laboratory study of mating behavior as related to diapause in overwintering Cacopsylla pyricola (Homoptera: Psyllidae).
EVETEX. Krysan, J.L. Lanham, Md. : Entomological Society of America. Mating activity of pear psylla, Cacopsylla pyricola (Foerster), with emphasis on the morphologically distinctive overwintering winterform generation, was characterized in the laboratory. Generally, one spermatophore was passed per copulation. Presence of light, size of the mating arena, and the number of leaves in the arena affected mating frequency; the highest mean frequency observed was 9.18 matings per 24 h. Diapausing psylla males, after being conditioned under long photoperiod (16:8 L:D), mated significantly more often than those conditioned under a photoperiod of 12:12 or 10:14 (L:D). The photoperiodic experience of the female did not affect mating frequency. Visual observation of behavior revealed that the winterform males conditioned under short days made as many sexual advances as winterform males conditioned under long days, but diapuase males were rejected by the females. Pairings of winterform females with summerform males had significantly fewer inseminations compared with pairings involving the same seasonal forms; there is a behavioral barrier to mating between the generations. Environmental entomology. June 1990. v. 19 (3). p. 551-557. Includes references. (NAL Call No.: DNAL QL461.E532).

0747

Larger egg clutches following host deprivation in colonized Ceratitis capitata (Diptera: Tephritidae).
JEENAI. McDonald, P.T. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1986. v. 79 (2). p. 392-394. Includes references. (NAL Call No.: DNAL 421 J822).

0748

The latest chapter in the continuing saga of the pear psylla.
PWHAA. Burts, E. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1987. (83rd). p. 197-199. (NAL Call No.: DNAL 81 W273).

0749

Leaf burial by the earthworm, Lumbricus terrestris (Oligochaeta: Lumbricidae), as a major factor in the population dynamics of Phyllonorycter blancardella (Lepidoptera: Gracillariidae) and its parasites.
EVETEX. Laing, J.E. Heraty, J.M.; Corrigan, J.E. College Park, Md. : Entomological Society of America. Environmental entomology. Apr 1986. v. 15 (2). p. 321-326. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

0750

Leaf Scorch Responses of 'Sensation' and 'Bartlett' Pear to twopspotted spider mite (Acari: Tetranychidae).
JEENAI. McNab, S.C. Jerie, P.H. Lanham, Md. : Entomological Society of America. The effect of 0, 2, 5, and 10 adult female twospotted spider mites, Tetranychus urticae Koch, per leaf on the percentage of leaf area affected by leaf scorch and leaf stippling was investigated in two pear cultivars, 'Bartlett' ('William Bon Chretien') and 'Sensation', a red 'Bartlett' mutation. The percentage of leaf area affected by stippling increased ($P < 0.001$) with increasing mite density on both varieties. There was no significant ($P > 0.05$) difference in the leaf-stippling response of the two cultivars. The percentage of leaf area affected by scorch was found to significantly increase ($P < 0.01$) on 'Bartlett' leaves with increasing mite density; virtually no leaf scorch was observed on 'Sensation' leaves. Mite densities were similar at each treatment level for 'Bartlett' and 'Sensation' leaves. This indicates a tolerance to leaf scorch resulting from twospotted spider mite feeding in the 'Sensation' variety. Journal of economic entomology. Aug 1991. v. 84 (4). p. 1334-1338. Includes references. (NAL Call No.: DNAL 421 J822).

0751

Learning of apple fruit biotypes by apple maggot flies.
JIBEE8. Prokopy, R.J. Papaj, D.R. New York, N.Y. : Plenum Publishing. Journal of insect behavior. Jan 1988. v. 1 (1). p. 67-74. Includes references. (NAL Call No.: DNAL QL496.J68).

0752

Location and survival of pear psylla eggs on pear budwood.
WSEPA. Horton, D.R. Pullman, Wash. : The Society. Proceedings of the Washington State Entomological Society. Meeting held on April 23 and September 17, 1988, Yakima, Washington. 1988. (50). p. 865-866. (NAL Call No.: DNAL QL461.W3).

0753

Longevity of apple maggot (Diptera: Tephritidae) lures under laboratory and field conditions in Utah.
EVETEX. Jones, V.P. College Park, Md. : Entomological Society of America. The longevities of five commerical lures and one experimental lure for apple maggot were determined in laboratory and field tests in Utah. The Pherocon AM panel exhibited a reduced fly capture efficiency when aged for 9 d before use, which correlated well with the 5-d longevity observed in laboratory tests. The apple volatile lure made by Consep Membranes and Great Lakes IPM lasted at least 40 d in laboratory and field tests. However, the Ladd Industries rubber septum was found to last only about 4 d in the same tests. The implications of lure longevity on the present confusion over trap choice for monitoring apple maggot are discussed. Environmental entomology. Aug 1988. v. 17 (4). p. 704-708. Includes references. (NAL Call No.: DNAL QL461.E532).

0754

Low-temperature storage as a postharvest treatment for coding moth (Lepidoptera: Tortricidae) eggs on apple.
JEENAI. Moffitt, H.R. Burditt, A.K. Jr. Lanham, Md. : Entomological Society of America. Complete mortality of red ring stage eggs of the codling moth, Cydia pomonella (L.), on mature apples occurred with 36-42 d exposure to 0.1-2.1 degrees C. Based on these results and those from previous studies, we propose a minimum of 55 d at less than or equal to 2.2 degrees C as a postharvest treatment for Malus domestica Borkh. cv. Red Delicious and Golden Delicious apples. In large-scale efficacy tests of this treatment, none of the treated 35,203 red ring stage eggs survived. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1679-1681. Includes references. (NAL Call No.: DNAL 421 J822).

0755

Malathion bait sprays for control of apple maggot (Diptera: Tephritidae).
JEENAI. Mohammad, A.B. Aliniazee, M.T. Lanham, Md. : Entomological Society of America. Malathion (1.2 g AI /liter, applied at 2-wk intervals for a total of four spray applications) was compared with malathion mixed with 0.25 and 0.5% Nulure bait for control of

the apple maggot, Rhagoletis pomonella (Walsh), in 1986 and 1987 seasons. Apples sprayed with malathion mixed with Nulure had the lowest fruit injury in both years. In 1986, fruit injury averaged 18.3 +/- 16.4% (average +/- SEM) in apples treated with malathion bait mixture compared with 39.0 +/- 9.5% in apples treated with malathion alone and 56.3 +/- 15.5% in untreated apples. In 1987, apple maggot injury in apples treated with malathion bait mixture averaged 3.7 +/- 3.2% compared with 45.7 +/- 2.7% in apples treated with malathion alone and 26.7 +/- 22.2% in untreated apples. Laboratory bioassays of residual toxicities of malathion against apple maggot adults at a rate of 1.2 g (AI)/liter indicated efficacy of less than 1 wk and complete ineffectiveness within 12 d after application on apple foliage and fruits. At the higher rate of 2.4 g (AI)/liter, only 17% mortality was noticed 16 d after application. Further laboratory tests indicated total adult mortality within 48 h and negligible rates of oviposition (less than 1 egg per female) in apples treated with malathion at rates of 0.3 and 0.6 g (AI)/liter mixed with 1% Nulure bait. In apples treated with malathion alone, 29 +/- 7.7% mortality occurred and 10 eggs per female were deposited at the end of 48 h for 0.3 (AI)/liter rate, and 21 +/- 7.7% mortality occurred and 16 eggs per female were deposited for 0.6 g (AI)/liter rate. Nulure alone at 1% had no adverse effects on survival and oviposition of apple maggot females. Results of these field and laboratory experiments showed that addition of Nulure bait to malathion increased adult mortality and reduced oviposition in treated apples. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1716-1721. Includes references. (NAL Call No.: DNAL 421 J822).

0756

Management of European red mite (Acari: Tetranychidae) and several aphid species on apple with petroleum oils and an insecticidal soap.
JEENAI. Lawson, D.S. Weires, R.W. Lanham, Md. : Entomological Society of America. Three petroleum oils and one insecticidal soap were evaluated in laboratory tests at different rates for ovicidal efficacy against overwintering Panonychus ulmi (Koch) eggs. Sunspray 6E and Volck Supreme oils caused the greatest mortality of all materials tested. Sunspray 6E+ caused less mortality than did the Sunspray 6E and Volck Supreme but greater mortality than Safer Insecticidal Soap Concentrate, which caused only slightly greater mortality than the distilled water check. Field applications of the same materials by airblast sprayer and high-pressure handgun caused less mortality of overwintering eggs than in the laboratory study. Summer applications of these materials were tested for their ability to suppress mite and aphid populations throughout the growing season. Applications of all materials provided significant control of populations of P. ulmi, rosy apple aphid, Dysaphis plantaginea (Passerini), and a green aphid complex made up of the apple aphid, Aphis pomi De Geer, and the spirea aphid, Aphis spiraecola Patch. Spray volume, coverage, and rate of material applied were related to mite and insect control and plant phytotoxicity; the greater the volume, coverage, and rates used, the greater the control and phytotoxicity obtained. Volck Supreme oil, particularly at the high rate, caused more damage to fruit and foliage than did any of the other treatments. Sunspray 6E and Sunspray 6E+ appear to be equally safe to fruit and foliage based on phytotoxicity ratings taken throughout the growing season. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1550-1557. Includes references. (NAL Call No.: DNAL 421 J822).

0757

Management of the apple maggot in the eastern United States.
OASPA. Reissig, W.H. Corvallis, Or. : The Station. Special report - Oregon State University, Agricultural Experiment Station. In the series analytic: Ecology and management of economically important fruit flies / edited by M.T. AliNiazee. July 1988. (830). p. 56-72. ill. Includes references. (NAL Call No.: DNAL 100 OR3M).

0758

Manipulation of oviposition patterns of the parasitoid Cyzenis albicans (Tachinidae) in the field using plant extracts.
JIBEE8. Roland, J. Evans, W.G.; Myers, J.H. New York, N.Y. : Plenum Publishing. Journal of insect behavior. July 1989. v. 2 (4). p. 487-503. Includes references. (NAL Call No.: DNAL QL496.J68).

0759

Mass rearing of the oriental fruit moth (Lepidoptera: Tortricidae).
JEENAI. Vetter, R.S. Esposito, R.M. III; Baker, T.C. Lanham, Md. : Entomological Society of America. Oriental fruit moth, Grapholita molesta (Busck), was reared on modifications of a previously developed small lima bean diet. Initial experiments showed that different types of beans substituted for lima beans produced similar yields of oriental fruit moth pupae. Fresh, thinning apples provided the best diet for high yields and high pupal weights, but apple quality degenerates with time, producing poorer quality pupae. Modifications of the bean diet resulted in quality production of greater than 1,000 pupae per 4-liter jar, allowing year-long maintenance of the colony that could not be accomplished on apples alone. Tolerance of oriental fruit moth to methyl p-hydroxybenzoate, sorbic acid, and benomyl (Benlate) preservatives in the diet was determined. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1825-1829. Includes references. (NAL Call No.: DNAL 421 J822).

0760

Methyl bromide fumigation and cold storage as treatments for California stone fruits and pears infested with the Caribbean fruit fly (Diptera: Tephritidae).
JEENAI. Benschoter, C.A. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1665-1667. Includes references. (NAL Call No.: DNAL 421 J822).

0761

Microgeographic genetic variation in the apple maggot Rhagoletis pomonella.
GENTA. McPheron, B.A. Smith, D.C.; Berlocher, S.H. Baltimore, Md. : Genetics Society of America. Abstract: We examined electrophoretic variability at five enzyme lociin the apple maggot fly, Rhagoletis pomonella, on a microgeographic scale. Treating flies from individual hawthron trees as separate populations, we estimated F(st) values from allele frequencies. The results indicate that there is significant allele frequency heterogeneity among fly populations over a small spatial scale at some loci but not at others. This variation among loci in degree of differentiation is itself statistically significant, casting doubt on the role of genetic drift in maintaining the heterogeneity. There is also heterogeneity betweenyears in flies from a given tree. These data provide a baseline with which future work on genetic differentiation among apple maggot populations associated with different species of host plants may be compared. Genetics. June 1988. v. 119 (2). p. 445-451. Includes references. (NAL Call No.: DNAL 442.8 G28).

0762

Microlepidoptera species composition in Michigan apple orchards.
EVETEX. Strickler, K. Whalon, M. College Park, Md. : Entomological Society of America. Environmental entomology. Aug 1985. v. 14 (4). p. 486-495. maps. Includes references. (NAL Call No.: DNAL QL461.E532).

0763

Minimize problems with practical approaches.
WEFGA. Cowie, V. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Feb 1986. v. 106 (2). p. 49-51. (NAL Call No.: DNAL 80 G85W).

0764

Mite (Acari) species composition in Michigan apple orchards.
EVETEX. Strickler, K. Cushing, N.; Whalon, M.; Croft, B.A. College Park, Md. : Entomological Society of America. Environmental entomology. Feb 1987. v. 16 (1). p. 30-36. Includes references. (NAL Call No.: DNAL QL461.E532).

0765

Mite management in apple orchards: new knowledge and tools.
NEMFA. Nyrop, J.P. Reissig, W.H.; Agnello, A.M. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held on February 1-2, 1989, Sturbridge, Massachusetts. Feb 1989. v. 95. p. 88-105. Includes references. (NAL Call No.: DNAL 81 M384).

0766

Mite management in the 1990's.
NEMFA. Weires, R. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 33-38. (NAL Call No.: DNAL 81 M384).

0767

Mixtures of Bacillus thuringiensis and pyrethroids control winter moth (Lepidoptera: Geometridae) in orchards without causing outbreaks of mites.
JEENAI. Hardman, J.M. Gaul, S.O. Lanham, Md. : Entomological Society of America. Extensive trials with mixtures of Bacillus thuringiensis var. kurstaki Berliner (Dipel wettable powder) and pyrethroids showed the efficacy of these mixtures against winter moth, Operophtera brumata (L.), and their compatibility, with integrated mite control in apple (Malus domestica Borkh.) orchards. In the mixtures, concentrations of the pyrethroids (cypermethrin, deltamethrin, fenvalerate, and permethrin) were one-tenth of the recommended orchard rates. Levels of winter moth injury to harvested fruit were as low with the mixtures of Dipel and pyrethroids as with half-rate or full-rate treatments of pyrethroids. Prebloom application of several mixtures significantly reduced fruit injury caused by mirids, mostly Atractotomus mali (Meyer) and Campylomma verbasci (Meyer), and the pale apple leafroller, Pseudexentera mali Freeman, and the obliquebanded leafroller, Choristoneura rosaceana (Harris). Counts of European red mite, Panonychus ulmi (Koch), and apple rust mite, Aculus schlechtendali (Nalepa), were lower, and populations of their principal natural enemy, Typhlodromus pyri Scheuten, were detected more frequently in plots treated with Dipel-pyrethroid mixtures than in plots treated with pyrethroids at half or full rates. Levels of leaf bronzing induced by European red mite and apple rust mite were also less where mixtures were used. The mixture of Dipel with the emulsifiable concentrate formulation of cypermethrin was particularly, compatible with integrated mite control. Counts of European red mite and levels of leaf bronzing induced by

European red mite with this mixture did not differ from the levels observed in the plots treated with Dipel alone. Journal of economic entomology. June 1990. v. 83 (3). p. 920-936. Includes references. (NAL Call No.: DNAL 421 J822).

0768

Model for the temperature-dependent emergence of overwintering Phyllonorycter crataegella (Clemens) (Lepidoptera: Gracillariidae), and its parasitoid, Sympiesis marylandensis Girault (Hymenoptera: Eulophidae).
EVETEX. Drummond, F.A. Van Driesche, R.G.; Logan, P.A. College Park, Md. : Entomological Society of America. Environmental entomology. June 1985. v. 14 (3). p. 305-311. ill., maps. Includes references. (NAL Call No.: DNAL QL461.E532).

0769

Model simulating the use of miticides to control European red mite (Acarina: Tetranychidae) in Nova Scotia apple orchards.
JEENAI. Hardman, J.M. Lanham, Md. : Entomological Society of America. A model was developed to simulate chemical control of the European red mite, Panonychus ulmi (Koch), in Nova Scotia apple orchards. Simulated densities of summer eggs and motile P. ulmi were similar to densities observed in experimental plots that had been treated with miticide on different dates. The P. ulmi model was used to estimate the best dates to apply miticides with different biological half-lives (7 or 30 d) and specific toxicities (i.e., toxic to all eggs; toxic only to summer eggs; toxic only to motile forms). Criteria of effectiveness of a given application were cumulative mite-days to 15 July, yield per tree, and density of P. ulmi winter eggs on 31 August. The best dates to apply miticide (usually shortly before or after winter eggs hatched) differed according to the characteristics of the miticide and the criterion of effectiveness (e.g., the best dates for preserving yield were not necessarily the best dates for reducing winter eggs). The model also indicated problems in the use of the current economic threshold based on counts of summer eggs and motile P. ulmi on leaves. If the initial P. ulmi population is moderate or high and the choice of application date is based on mite density on leaves, then application of miticide may be too late to prevent significant yield losses in the current year, a high population of winter eggs at the end of the season, and reduced return bloom and yield the following year. The model suggests the importance of early spring assessments of winter egg density and the necessity of considering age structure of the P. ulmi population and characteristics of the miticide in selecting dates for miticide application. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1411-1422. Includes references. (NAL Call No.: DNAL 421 J822).

0770

Monitoring adult flight of Pholetesor ornigis (Hymenoptera: Braconidae), a parasitoid of the spotted tentiform leafminer (Lepidoptera: Gracillariidae).
EVETEX. Ridgway, N.M. Mahr, D.L. College Park, Md. : Entomological Society of America. Environmental entomology. Apr 1986. v. 15 (2). p. 331-334. Includes references. (NAL Call No.: DNAL QL461.E532).

0771

Monitoring adult Melanotus (Coleoptera: Elateridae) in the Midwest with the Pheromone of tufted apple budmoth (Platynota idaeusalis Walker) (Lepidoptera: Tortricidae).
JKESA. Keaster, A.J. Jackson, M.A.; Levine, E.; Tollefson, J.J.; Turpin, F.T. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Oct 1987. v. 60 (4). p. 577-580. Includes references. (NAL Call No.: DNAL 420 K13).

0772

Monitoring and management of resistance of the European red mite to plictran in New York apple orchards.
NEMFA. Reissig, H. Welty, C.; Weires, R.; Dennehy, T. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1985 and 1986 studies. 1987. v. 93. p. 97-107. (NAL Call No.: DNAL 81 M384).

0773

Monitoring azinphosmethyl resistance in adult male Platynota idaeusalis (Lepidoptera: Tortricidae) in apple from Georgia to New York.
JEENAI. Knight, A. Hull, L.; Rajotte, E.; Hogmire, H.; Horton, D.; Polk, D.; Walgenbach, J.; Weires, R.; Whalon, J. Lanham, Md. : Entomological Society of America. Sex pheromone traps coated with concentrations of azinphosmethyl-impregnated adhesive were used to test levels of resistance in adult populations male tufted apple bud moth, Platynota idaeusalis (Walker) from apple orchards in seven Eastern states. Resistance levels > 10 fold were found in insects from five of six Adams County, Pa., orchards, one orchard in New Jersey, and one of two orchards in West Virginia. Moderate levels of resistance (5 to 9-fold) were found in insects from the remaining orchard in Adams County, one orchard in New York, and one of two orchards in North Carolina. Males from three Pennsylvania orchards outside of Adams County, the other orchards in West Virginia and North Carolina, one orchard in Georgia, and two orchards in Delaware had low levels of resistance (<4-fold). These results suggest that the level of resistance found within an orchard may be influenced by the intensity of fruit production

within a region. Level of resistance to azinphosmethyl was positively correlated with current seasonal carbamate use, but was not significantly correlated with current use of azinphosmethyl or other organophosphates (negative correlation coefficients). Levels of resistance and fruit injury were both significantly correlated with population densities in orchards as measured by mean daily catches of brood I or brood II male moths. Levels of resistance were not significantly correlated with surrounding habitat types or percentage of fruit injury. These results suggest that many apple growers have responded to the development of azinphosmethyl resistance within their orchards with increased use of carbamates and decreased use of azinphosmethyl. Levels of fruit injury were highest in orchards where populations of P. idaeusalis were moderately resistant to azinphosmethyl, seasonal azinphosmethyl use was high, and only small amounts of carbamate insecticides were used. Journal of economic entomology. Apr 1990. v. 83 (2). p. 329-334. Includes references. (NAL Call No.: DNAL 421 J822).

0774

Monitoring azinphosmethyl resistance in Archips agyrospila (Lepidoptera: Tortricidae) populations.
JEENAI. Cossentine, J.E. Jensen, L.B. Lanham, Md. : Entomological Society of America. Azinphosmethyl was applied topically to the dorsal thorax of male fruittree leafroller moths, Archips agyrospila (Walker), caught in pheromone traps from 1986 to 1988 to test the tolerance of this pest within individual orchards. The LC50's estimated with this technique generally reflected the control problems experienced in the individual orchards and were correlated with the tolerance exhibited by neonate fruittree leafrollers fed diet containing azinphosmethyl in laboratory bioassays. However, high control mortality, and a lack of understanding of behavior in the adult males in response to pheromones and the natural variation in mortality, decrease the reliability of this technique in assessing the azinphosmethyl resistance of individual fruittree leafroller orchard populations. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1399-1403. Includes references. (NAL Call No.: DNAL 421 J822).

0775

Monitoring azinphosmethyl resistance in the light brown apple moth (Lepidoptera: Tortricidae) in New Zealand.
JEENAI. Suckling, D.M. Rogers, D.J.; Shaw, P.W.; Wearing, C.H.; Penman, D.R.; Chapman, R.B. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1987. v. 80 (4). p. 733-738. maps. Includes references. (NAL Call No.: DNAL 421 J822).

0776

Monitoring Orthosia hibisci (Lepidoptera: Noctuidae) with pherocon 1C and Hara traps.
JEENAI. Vincent, C. Simard, L.G. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1986. v. 79 (6). p. 1487-1500. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0777

Monitoring Pholetesor ornigis (Hymenoptera: Braconidae), a parasite of the spotted tentiform leafminer, Phyllonorycter blancardella (Lepidoptera: Gracillariidae): effect of sticky trap location on size and sex ratio of trap catches.
EVETEX. Trimble, R.M. College Park, Md. : Entomological Society of America. Abstract: The effect of trap location on the number and sex ratio of adult Pholetesor (=Apanteles) ornigis (Weed) caught on yellow sticky traps was examined in Ontario from 1982 to 1985 during the spring and first-summer activity periods in one experimental and five commercial apple orchards. In the first experiment, traps placed within the tree canopy in the peripheral zone caught significantly more P. ornigis than traps placed above, within, and below the tree canopy, as well as those placed between adjacent trees in the peripheral and interior zones of the orchard. Traps placed above the tree in both zones caught less than 1% of all parasites trapped. In the second experiment, traps placed within the tree canopy in the interior zone caught significantly more male, female, and total P. ornigis than traps placed below the tree in the interior zone and within and below the tree in the peripheral zone during both the spring and first summer activity periods. The results suggest that the spatial distribution of male and female parasites changes between the spring and first-summer activity periods. Trap location did not significantly affect the sex ratio of trap catches; males constituted from 82.3 +/- 13.6 to 87.2 +/- 7.7% (-/x +/-SD) of the catch. The percentage of males in trap catches from an orchard ranged from 75.6 to 96.4 during the two activity periods, whereas estimates of the percentage of males in the adult population from an orchard ranged from 4.0 to 63.0. Environmental entomology. June 1988. v. 17 (3). p. 567-571. Includes references. (NAL Call No.: DNAL QL461.E532).

0778

Monitoring the codling moth (Lepidoptera: Olethreutidae) and the obliquebanded leafroller (Lepidoptera: Tortricidae) with sticky and nonsticky traps.
JEENAI. Vincent, C. Mailloux, M.; Hagley, E.A.C.; Reissig, W.H.; Coli, W.M.; Hosmer, T.A. Lanham, Md. : Entomological Society of America. In monitoring trials conducted in 1985 in 17 apple orchards of Quebec, Ontario, Massachusetts, and New York, two sticky pheromone trap models (Pherocon 1C and Pherocon

II) and two nonsticky trap models (Multi-Pher I and III) were tested to monitor the codling moth, Cydia pomonella L., and the obliquebanded leafroller, Choristoneura rosaceana (Harris). Three criteria of trap performance were considered: 1) total seasonal captures, (2) maximum seasonal captures of the first generation, and (3) first date of captures. Trap performance varied between sprayed and unsprayed orchards. In sprayed orchards, Pherocon 1C and Multi-Pher I had higher codling moth captures than expected; however, no trap model was consistently superior for monitoring of obliquebanded leafroller. For codling moth, Multi-Pher I consistently had a higher frequency of maximum seasonal captures than other trap models. For the obliquebanded leafroller, the two sticky trap models had a higher frequency of maximum captures than other trap models in sprayed orchards. Pherocon II was the best trap for evaluation of the first date of capture of codling moth in sprayed and unsprayed orchards and obliquebanded leafroller in sprayed orchards. Journal of economic entomology. Apr 1990. v. 83 (2). p. 434-440. Includes references. (NAL Call No.: DNAL 421 J822).

0779

Native and exotic rosaceous hosts of apple, plum, and quince curculio larvae (Coleoptera: Curculionidae) in the northeastern United States.
JEENAI. Maier, C.T. Lanham, Md. : Entomological Society of America. Native and exotic rosaceous fruits were sampled to determine hosts of apple curculio, Anthonomus quadrigibbus Say, plum curculio, Conotrachelus nenuphar (Herbst), and quince curculio, C. crataegi Walsh, larvae. One or more species of these univoltine weevils infested 22 of 24 (91.7%) rosaceous species, including 13 native ones. Weevil infestations tended to be greater in exotic fruits than native fruits. The plum curculio had the broadest host range (19 species), followed by the apple curculio (9 species), and the quince curculio (6 species). Principal apple curculio hosts were native Amelanchier spp., Crataegus spp., and Prunus serotina Ehrhart. The apple curculio did not attack apple, Malus domestica Borkhausen, or most other exotic fruits in areas sampled. Ten native fruits, mainly Amelanchier spp. and Prunus spp., and nine exotic orchard fruits were infested by the plum curculio. The quince curculio developed in fruits of two native Crataegus spp. and four exotic orchard species. Selective removal of wild rosaceous reservoirs of these curculios may reduce fruit damage in commercial orchards. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1326-1332. Includes references. (NAL Call No.: DNAL 421 J822).

0780

Natural enemies of the spotted tentiform leafminer, Phyllonorycter blancardella (Lepidoptera: Gracillariidae), in sprayed and unsprayed apple orchards in Wisconsin.
EVETEX. Ridgway, N.M. Mahr, D.L. College Park, Md. : Entomological Society of America. Environmental entomology. Aug 1985. v. 14 (4). p. 459-463. Includes references. (NAL Call No.: DNAL QL461.E532).

0781

New host and distributional records for Rhagoletis in Colorado.
SENTD. Kroening, M.K. Kondratieff, B.C.; Nelson, E.E. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. June 1989. v. 14 (2). p. 147-152. Includes references. (NAL Call No.: DNAL QL461.S65).

0782

New host records and developmental notes on the pear slug Caliroa cerasi (Hymenoptera: Tenthredinidae), feeding on Cotoneaster and Chaenomeles species.
GRLEA. Raffa, K.F. Lintereur, G.L. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Summer 1988. v. 21 (2). p. 75-79. Includes references. (NAL Call No.: DNAL QL461.M5).

0783

A new pesticide bioassay method for white apple leafhopper.
WSEPA. Beers, E.H. Elsner, E.A. Pullman, Wash. : The Society. Proceedings of the Washington State Entomological Society. Meeting held on April 23 and September 17, 1988, Yakima, Washington. 1988. (50). p. 872. (NAL Call No.: DNAL QL461.W3).

0784

No carcinogen/zero residue production system for apples.
ARHMA. Jones, A.L. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 176-180. (NAL Call No.: DNAL 81 M58).

0785

Nonsticky pheromone-baited traps for monitoring the spotted tentiform leafminer (Lepidoptera: Gracillariidae).
JEENAI. Vincent, C. Mailloux, M.; Hagley, E.A.C. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1986. v. 79 (6). p. 1666-1670.

Includes references. (NAL Call No.: DNAL 421 J822).

0786

Novel approach for tracking and quantifying the movement patterns of insects in three dimensions under seminatural conditions.
EVETEX. Aluja, M. Prokopy, R.J.; Elkinton, J.S.; Laurence, F. Lanham, Md. : Entomological Society of America. We describe a method that permits tracking and quantifying the movement patterns of insects in three dimensions under seminatural conditions. We released individual Rhagoletis pomonella flies onto an apple tree and recorded all movements and behavior of the foraging insect. The type information obtained included: measurement of relative distance flown (net and gross displacement, average distance between stops), relative directness of flight from the fly release point to any point within the tree, relative speed of flight, relative angle and vector information for individual and total displacements, and time spent performing individual behaviors. All these parameters were calculated over the total time the insect spent on the tree and for specific time and spatial windows of particular interest. We also describe a computer program that processes and partially analyzes the gathered data. The usefulness of 3-D analysis is illustrated by providing results that show a trend for reduction in the relative distance flown and for an increase in the directness of flight by flies that searched for and landed on fruit models, that released synthetic apple odor compared with models that did not. Environmental entomology. Feb 1989. v. 18. p. 1-7. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

0787

Observations of woolly apple aphid, Eriosoma lanigerum (Hausmann) (Homoptera: Aphididae), root infestation in eastern West Virginia.
MLESB. Brown, M.W. University Park, Pa. : Entomological Society of Pennsylvania. The Melsheimer entomological series. 1986. (36). p. 5-8. Includes references. (NAL Call No.: DNAL QL461.M4).

0788

Observations on mortality, detection distance, and rate of loss of label in plum curculio (Coleoptera: Curculionidae), using improved techniques for topical application of radioisotopes on insects.
JEENAI. Lafleur, G. Hill, S.B.; Barthakur, N.N. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1985. v. 78 (5). p. 1157-1165. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0789

Occurrence of pyrethroid resistance in pear psylla (Homoptera: Psyllidae) populations from southern Ontario.
JEENAI. Pree, D.J. Archibald, D.E.; Ker, K.W.; Cole, K.J. Lanham, Md. : Entomological Society of America. Adult pear psylla, Cacopsylla pyricola Foerster, from the Niagara peninsula of Ontario were tested for susceptibility to pyrethroid insecticides from 1980 to 1989. A Potter spray tower was used. Results of tests at 15, 22, and 30 degrees C indicated a negative temperature-toxicity relationship for permethrin and fenvalerate. Resistance to pyrethroids (first discovered in 1986 at levels of approximately 50-fold for permethrin at the LC50) has become widespread in the Niagara region. Resistance extends to all types of pyrethroids but is highest to fenvalerate (approximately 140-fold). Combinations of permethrin and potential synergists piperonyl butoxide or DEF did not increase the toxicity to resistant populations, suggesting that resistance was due to an insensitive target site or kdr-like mechanism. In one resistant population studied over 4 yr without further selection with pyrethroids, resistance declined from 54-fold to approximately 30-fold after 1 yr and stabilized at 20-30-fold. Journal of economic entomology. Dec 1990. v. 83 (6). p. 2159-2163. Includes references. (NAL Call No.: DNAL 421 J822).

0790

Overwintering of Phyllonorycter blancardella (Lepidoptera: Gracillariidae) and its parasites, Pholetesor ornigis and Pholetesor pedias (Hymenoptera: Braconidae) in southwestern Ontario.
EVETEX. Laing, J.E. Heraty, J.M. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1987. v. 16 (5). p. 1157-1162. Includes references. (NAL Call No.: DNAL QL461.E532).

0791

Ovicidal activity of insecticides on the spotted tentiform leafminer (Lepidoptera: Gracillariidae).
JEENAI. Hayden, J.P. Howitt, A.J. College Park, Md. : Entomological Society of America. Journal of economic entomology. Feb 1986. v. 79 (1). p. 258-260. Includes references. (NAL Call No.: DNAL 421 J822).

0792

Ovicidal activity of methomyl on eggs of pest and beneficial insects and mites associated with apples in Virginia.
JEENAI. David, P.J. Horsburgh, R.L. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1985. v. 78 (2). p. 432-436. Includes references. (NAL Call No.: DNAL 421 J822).

0793

Oviposition behavior of the apple blotch leafminer, Phyllonorycter crataegella (Clemens) (Lepidoptera: Gracillariidae).
JNYEA. Green, T.A. Prokopy, R.J. Lawrence, Kan. : Allen Press. Journal of the New York Entomological Society. Oct 1991. v. 99 (4). p. 654-663. Includes references. (NAL Call No.: DNAL 420 N48J).

0794

Oviposition by overwintering morph of pear psylla (Homoptera: Psyllidae) with information on conditioning.
EVETEX. Horton, D.R. Lanham, Md. : Entomological Society of America. Environmental entomology. Apr 1990. v. 19 (2). p. 357-361. Includes references. (NAL Call No.: DNAL QL461.E532).

0795

Oviposition by summer and winter forms of pear psylla (Homoptera: Psyllidae) on dormant pear budwood.
EVETEX. Butt, B.A. Stuart, C. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1986. v. 15 (5). p. 1109-1110. Includes references. (NAL Call No.: DNAL QL461.E532).

0796

Ovipositional behavior of the codling moth (Lepidoptera: Tortricidae) on stone fruits in the field and an improved oviposition cage for use in the laboratory.
JEENAI. Curtis, C.E. Tebbets, J.S.; Clark, J.D. Lanham, Md. : Entomological Society of America. dling moth, Cydia pomonella (L.), adult pairs were confined in sleeve cages on fruits, stems, and leaves of nectarine, peach, and plum trees. Female moths laid more eggs on the lower leaf surface (56-68%) than on the upper leaf surface (22-30%); stems (3-13%); or fruit (0-12%) of all three cultivars of each fruit type. The level of pubescence reported to deter oviposition (about 70 hairs per cm2) was higher than that found on any oviposition site available in our studies, except for peach fruits. When only fruit (no foliage) was available, the distribution of eggs was 0% on peaches, 12.6% on plums, 46.8% on nectarines, and 40.6% on parts of the cage. A modified oviposition cage is described that uses velour paper as a pubescent surface to deter oviposition on selected cage surfaces and forces most egg deposition onto waxed paper end caps. Journal of economic entomology. Feb 1990. v. 83 (1). p. 131-134. Includes references. (NAL Call No.: DNAL 421 J822).

0797

Panel: A pear grower's dilemma--Spider-mite resistance to miticides.
PWHAA. Beers, B. Westigard, P.; Van Buskirk, P.; Flexner, J.L.; Croft, B.A. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 196-202. (NAL Call No.: DNAL 81 W273).

0798

Parasites associated with lepidopterous leaf miners on apple in northeastern Wisconsin.
JEENAI. Oatman, E.R. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1985. v. 78 (5). p. 1063-1066. Includes references. (NAL Call No.: DNAL 421 J822).

0799

Parasitoid fauna of two Phyllonorycter spp. (Lepidoptera: Gracillariidae) on wild cherries, and similarity to fauna of apple leafminers.
AESAAI. Maier, C.T. College Park, Md. : The Society. Annals of the Entomological Society of America. May 1988. v. 81 (3). p. 460-466. Includes references. (NAL Call No.: DNAL 420 EN82).

0800

Parasitoids of the western tentiform leafminer, Phyllonorycter elmaella (Lepidoptera: Gracillariidae), in Utah apple orchards.
EVETEX. Barrett, B.A. Jorgensen, C.D. College Park, Md. : Entomological Society of America. Environmental entomology. June 1986. v. 15 (3). p. 635-641. Includes references. (NAL Call No.: DNAL QL461.E532).

0801

Patch dynamics of a phytophagous mite population: effect of number of subpopulations.
ECOLA. Walde, S.J. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. Oct 1991. v. 72 (5). p. 1591-1598. Includes references. (NAL Call No.: DNAL 410 EC7).

0802

Patterns of egg mass deposition of Platynota idaeusalis (Lepidoptera: Tortricidae) within an apple orchard.
EVETEX. Knight, A.L. Hull, L.A.; Rajotte, E.G. Lanham, Md. : Entomological Society of America. Two field releases of rubidium (Rb)-labeled, laboratory-reared adult Platynota idaeusalis (Walker) were conducted to measure female adult dispersal and egg mass deposition patterns within a 33-ha (about 7,450 trees) apple

orchard in Adams County, Pa. In both studies greater than 3,200 virgin male and female adults (male:female ratio = 1.1:1.0) were reared from rubidium-incorporated diet (3 g Rb/liter) and released on four center trees. Trees were randomly sampled for hatched and unhatched egg masses up to 500 m from the release sites. Atomic absorption spectrophotometry was used to detect rubidium in egg masses, and masses were considered marked if concentrations were greater than 10 ppb. Following the first release, 417 trees w ere sampled and 39% of the 222 egg masses collected were marked. Following the second release, 260 trees were sampled and 67% of the 346 egg masses collected were marked. The distribution of rubidium-labeled egg masses demonstrated that spatial patterns of egg mass deposition are primarily local and are affected by ambient air temperatures. For example, 90% of all recovered rubidium-labeled egg masses were found within 65 and 45 m of the release sites, and the most distant labeled egg mass we found at 250 and 170 m, respectively, following adult releases during a warm period in July (daily minimum temperatures, greater than 16 degrees C) and a cooler period in September (daily minimum temperatures, less than 12 degrees C). Environmental entomology. June 1990. v. 19 (3). p. 648-655. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

0803

Pear psylla--is integrated management possible?.
PWHAA. Willett, M. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1986. (82nd). p. 141-148. (NAL Call No.: DNAL 81 W273).

0804

Pear slug.
WUEXA. Antonelli, A. Young, J.O. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Mar 1986. (1369). 2 p. ill. (NAL Call No.: DNAL 275.29 W27P).

0805

Pear thrips: a new pest in New England?.
NEMFA. Hollingsworth, C. Coli, W.; Maier, C. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 28-32. ill. (NAL Call No.: DNAL 81 M384).

0806

Pears.
MUCBA. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Dec 1986. (E-154). p. 29-31. (NAL Call No.: DNAL 275.29 M58B).

0807

Pesticide use and levels of insect and scab injury on fruit in Nova Scotia apple orchards.
JEENAI. Hardman, J.M. Rogers, R.E.L.; MacLellan, C.R. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1987. v. 80 (4). p. 979-984. Includes references. (NAL Call No.: DNAL 421 J822).

0808

Pests not known to occur in the United States or of limited distribution. 62.
Whittle, K. Hyattsville, Md. : The Service. APHIS 81 - U.S. Department of Agriculture, Animal and Plant Health Inspection Service. Sept 1985. (46). p. 23-32. ill., maps. Includes references. (NAL Call No.: DNAL aSB599.A3U5).

0809

Pests not known to occur in the United States or of limited distribution. 63.
Chang, L.W.H. Hyattsville, Md. : The Service. APHIS 81 - U.S. Department of Agriculture, Animal and Plant Health Inspection Service. Sept 1985. (46). p. 33-44. ill., maps. Includes references. (NAL Call No.: DNAL aSB599.A3U5).

0810

Phenology and management of the obliquebanded leafroller (Leipidoptera: Tortricidae) in apple orchards.
JEENAI. Onstad, D.W. Reissig, W.H.; Shoemaker, C.A. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1985. v. 78 (6). p. 1455-1462. Includes references. (NAL Call No.: DNAL 421 J822).

0811

Pheromone trapping of males and prediction of crawler emergence for San Jose scale (Homoptera: Diaspididae) in Virginia apple orchards.
GENSAB. Pfeiffer, D.G. Tifton, Ga. : The Society. Journal of Entomological Science. July 1985. v. 20 (3). p. 351-353. Includes references. (NAL Call No.: DNAL QL461.G4).

0812

Pollen diet of some predator mites.
TKASAT. Afifi, A.M. Potts, M.F.; Patterson, C.G.; Rodriguez, J.G. Louisville, Ky. : The Academy. Transactions of the Kentucky Academy of Science. Sept 1988. v. 49 (3/4). p. 96-100. Includes references. (NAL Call No.: DNAL 500 K41).

0813

Population cycles of western tent caterpillars: experimental introductions and synchrony of fluctuations.
ECOLA. Myers, J.H. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. June 1990. v. 71 (3). p. 986-995. Includes references. (NAL Call No.: DNAL 410 EC7).

0814

Potential for the biological control of apple leafminers by parasitic warps.
NEMFA. Maier, C.T. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 60-74. Includes references. (NAL Call No.: DNAL 81 M384).

0815

Practical pear pest management for the 90's.
PWHAA. Smith, F. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1989. (85th). p. 210. (NAL Call No.: DNAL 81 W273).

0816

Practice mite management.
Willoughby, Ohio : Meister Publishing Company. American fruit grower. June 1985. v. 105 (6). p. 30, 32-33. ill. (NAL Call No.: DNAL 80 G85).

0817

Predation by Cheiracanthium mildei (Araneae, Clubionidae) on larval Phyllonorycter blancardella (Lepidoptera, Gracillariidae) in a greenhouse.
JARCD. Corrigan, J.E. Bennett, R.G. Lubbock, Tex. : American Arachnological Society. The Journal of arachnology. Spring 1987. v. 15 (1). p. 132-134. Includes references. (NAL Call No.: DNAL QL451.J6).

0818

Predicting apple injury caused by Platynota idaeusalis (Lepidoptera: Tortricidae) from summer brood sampling.
JEENAI. Meagher, R.L. Jr. Hull, L.A. College Park, Md. : Entomological Society of America. Journal of economic entomology. June 1986. v. 79 (3). p. 620-625. Includes references. (NAL Call No.: DNAL 421 J822).

0819

Predicting seasonal apple injury by tufted apple bud moth (Lepidoptera: Tortricidae) with early-season sex pheromone trap catches and brood I fruit injury.
EVETEX. Knight, A.L. Hull, L.A. Lanham, Md. : Entomological Society of America. Cumulative catches brood I tufted apple bud moth, Platynota idaeusalis (Walker), males in sex pheromone traps early in the season (before 28 May) provided a significant predictor of total-season fruit injury for the apple cultivars Yorking and Delicious but not for Golden Delicious during 1966 and 1987. Early-season pheromone trap catches were also significant predictors of brood I injury for Yorking in 1986 and Delicious in 1987. Incorporating a measure of tree size with these cumulative trap catches improved the prediction of total fruit injury for the cultivars Delicious and Yorking in 1987. Significant regressions of total fruit injury with first-brood injury also were found for each cultivar except Golden Delicious in 1987. The potential use of these early-season measures of population densities to more effectively manage tufted apple bud moth on apple is discussed. Environmental entomology. Dec 1989. v. 18 (6). p. 939-944. maps. Includes references. (NAL Call No.: DNAL QL461.E532).

0820

A preliminary study on the dispersal of European red mite, Panonychus ulmi (Koch), in apple orchards.
WSEPA. Chen, C.T. Tanigoshi, L.K. Pullman, Wash. : The Society. Proceedings - Washington State Entomological Society. Apr 19/Oct 18, 1986. (48). p. 811-812. Includes references. (NAL Call No.: DNAL QL461.W3).

0821

Premating and postmating isolation among populations of Metaseiulus occidentalis (Nesbitt) (Acarina: Phytoseiidae).
HILGA. Hoy, M.A. Cave, F.E. Berkeley, Calif. : California Agricultural Experiment Station. Hilgardia : a journal of agricultural science. Nov 1988. v. 56 (6). p. 1-20. ill. Includes references. (NAL Call No.: DNAL 100 C12H).

0822

Prey of the cribellate spider, Dictyna annulipes (Araneae, Dictynidae), on apple tree foliage.
JARCD. Hagley, E.A.C. Allen, W.R. Lubbock, Tex. : American Arachnological Society. The journal of arachnology. Fall 1989. v. 17 (3). p. 366-367. Includes references. (NAL Call No.: DNAL QL451.J6).

0823

Prey preference in Stethorus punctum (Coleoptera: Coccinellidae).
EVETEX. Houck, M.A. College Park, Md. : Entomological Society of America. Environmental entomology. Aug 1986. v. 15 (4). p. 967-970. Includes references. (NAL Call No.: DNAL QL461.E532).

0824

Prior experience influences the fruit residence of male apple maggot flies, Rhagoletis pomonella.
JIBEE8. Prokopy, R.J. Cooley, S.S.; Opp, S.B. New York, N.Y. : Plenum Publishing. Journal of insect behavior. Jan 1989. v. 2 (1). p. 39-48. Includes references. (NAL Call No.: DNAL QL496.J68).

0825

Probing and oviposition-related activity of summerform pear psylla (Homoptera: Psyllidae) on host and nonhost substrates.
EVETEX. Horton, D.R. Krysan, J.L. Lanham, Md. : Entomological Society of America. Environmental entomology. Oct 1990. v. 19 (5). p. 1463-1468. Includes references. (NAL Call No.: DNAL QL461.E532).

0826

Quantifying apple maggot (Diptera: Tephritidae) preference for apples to optimize the distribution of traps among trees.
EVETEX. Murphy, B.C. Wilson, L.T.; Dowell, R.V. Lanham, Md. : Entomological Society of America. The spatial arid temporal distribution pattern of apple maggot, Rhagoletis pomonella (Walsh), fly captures was monitored among trees within an unmanaged apple orchard. Each tree within the orchard was monitored weekly for the presence of flies using sticky traps. Fruit maturity was monitored weekly to determine percentage soluble solids. Significantly more apple maggot were captured on trees with mature fruit than on trees with immature fruit. A selective predation model was used to quantify the effect of fruit preference on apple maggot captures. Two hypotheses were evaluated. The first hypothesis was that fly capture among trees is a function of the relative sequence or phenology of fruit maturation (tree category hypothesis). The second hypothesis was that fly capture among trees is a function of apple maturity among trees, regardless of the phenology, of fruit maturation (fruit maturity hypothesis;. Both models explained the distribution of fly capture among trees early in the growing season, but the fruit maturity hypothesis best explained the entire season. The use of the model for predicting the distribution pattern of apple maggot captures and the optimum placement of traps for apple maggot detection are discussed. Environmental entomology. Aug 1991. v. 20 (4). p. 981-987. Includes references. (NAL Call No.: DNAL QL461.E532).

0827

Rearing predator mites for orchards and glasshouses.
MUCBA. Cushing, N. Whalon, M.E. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. May 1986. (1872). 8 p. ill. (NAL Call No.: DNAL 275.29 M58B).

0828

Recovery of populations of codling moth, Laspeyresia pomonella L. (Lepidoptera, Tortricidae) after severe reduction due to extreme conditions.
ENREB. Zlatanova, A.A. New York, N.Y. : Scripta Publishing. Entomological review. Translated from: Entomologicheskoye obozreniye, no. 1, 1989, p. 48-50. (421 R322). 1990. v. 69 (3). p. 47-49. Includes references. (NAL Call No.: DNAL 421 R322AE).

0829

Redbanded leafroller (Lepidoptera: Tortricidae): thermal requirements for development and simulation of within-season phenology in North Carolina.
EVETEX. Hawthorne, D.J. Rock, G.C.; Stinner, R.E. College Park, Md. : Entomological Society of America. Environmental entomology. Feb 1988. v. 17 (1). p. 40-46. Includes references. (NAL Call No.: DNAL QL461.E532).

0830

Regional, local and microgeographic allele frequency variation between apple and hawthorn populations of Rhagoletis pomonella in western Michigan.
EVOLA. Feder, J.L. Chilcote, C.A.; Bush, G.L. Lawrence, Kan. : Society for the Study of Evolution. Evolution. May 1990. v. 44 (3). p. 595-608. Includes references. (NAL Call No.: DNAL 443.8 EV62).

0831

Relationship between densities of pear psylla and twospotted spider mite and pear leaf nutrient levels.
HJHSA. Sugar, D. Righetti, T.L.; Westigard, P.H. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1989. v. 24 (2). p. 242-245. Includes references. (NAL Call No.: DNAL SB1.H6).

0832

Relationship between fall catches of Campylomma verbasci (Heteroptera: Miridae) in traps baited with females and density of nymphs in the spring.
JEENAI. Smith, R.F. Borden, J.H. Lanham, Md. : Entomological Society of America. Male mullein bugs, Campylomma verbasci (Meyer), were captured in 27 traps baited with live females in the fall within 10 apple orchards in the Okanagan Valley, British Columbia. When the catches of males from 14 September to 13 October 1987 were compared with limb tap samples of nymphs in the following spring, the relationships in the trap trees (r2 = 0.61) and trees adjacent to the trap trees (r2 = 0.56) were significant. Similar positive relationships occurred for four shorter trapping intervals but not for the final interval from 3 to 13 October, when trap catches were low, These results suggest that when a synthetic pheromone is available for this mirid, prediction of economic injury, levels may be made in the fall, 6-8 mo before egg hatch. Limb tap sampling in the spring could then be concentrated in orchards with the highest probability of damage to the crop. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1506-1509. Includes references. (NAL Call No.: DNAL 421 J822).

0833

Relationship between field efficacy and laboratory estimates of susceptibility to cyhexatin in populations of European red mite (Acari: Tetranychidae).
JEENAI. Welty, C. Reissig, W.H.; Dennehy, T.J.; Weires, R.W. Lanham, Md. : Entomological Society of America. The relationship between field and laboratory estimates of susceptibility to cyhexatin was studied for 2 yr in populations of European red mite (ERM), Panonychus ulmi (Koch), in commercial apple orchards. Field efficacy, expressed as reduction in cumulative mite-days in treated plots relative to untreated plots, was compared with mortality of field-collected ERM exposed to cyhexatin residues in 24-h leafless bioassays. In 1986, population susceptibility to cyhexatin based on two early-season applications in field trials was similar to that derived from laboratory bioassays for 12 of the 14 orchard populations that were assessed. In 1987, bioassay response of six orchard populations was compared with the efficacy of one versus two cyhexatin applications and with early-season versus summer applications of cyhexatin. Population susceptibility as determined by efficacy of early-season treatments was in agreement with susceptibility in bioassay for four of six populations tested. Summer treatments were less effective than early-season treatments and did not reflect bioassay estimates of susceptibility as well as early-season treatments did. Control was better than expected in several cases. It was concluded that predictions of field efficacy cannot be based on laboratory bioassays alone; mite population dynamics and operational factors related to the cyhexatin application and orchard management also must be considered. Journal of economic entomology. Apr 1989. v. 82 (2). p. 354-364. Includes references. (NAL Call No.: DNAL 421 J822).

0834

Relationship between fruit phenology and infestation by the apple maggot (Diptera: Tephritidae) in Utah.
AESAAI. Messina, F.J. Jones, V.P. Lanham, Md. : The Society. Annals of the Entomological Society of America. July 1990. v. 83 (4). p. 742-752. Includes references. (NAL Call No.: DNAL 420 EN82).

0835

Relationships between leaf: fruit ratio and varying levels of European red mite stress on fruit size and return bloom of apple.
JOSHB. Beers, E.H. Hull, L.A.; Grimm, J.W. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. July 1987. v. 112 (4). p. 608-612. Includes references. (NAL Call No.: DNAL 81 SO12).

0836

Relationships of foliar azinphosmethyl concentration, exposure time, and mortality for the apple maggot (Diptera: Tephritidae).
JEENAI. Stanley, B.H. Reissig, W.H.; Shoemaker, C.A.; Robson, D.S. Lanham, Md. : Entomological Society of America. A laboratory bioassay to study the effects of azinphosmethyl on adult apple maggot, Rhagoletis pomonella (Walsh), mortality and oviposition was developed by placing apple branches bearing field-weathered residues inside a wind tunnel. Repellency by azinphosmethyl that was observed in a previous study did not occur. Thirty-six percent of the females died after 24 h of exposure to 29- to 30-d-old residues, and the oviposition punctures per females were 66% lower than that in the untreated controls. This reduction in oviposition was greater than would have been expected from mortality alone and is probably caused by sublethal poisoning. These results imply that sufficient protection may be provided by older residues (greater than 14d) when apple maggot populations are low. Mortality was described by two mathematical models, which were corrected for the time that

the flies spent on the nontoxic walls. The relationships developed in this study should contributed to the development of a "treat-when-needed" strategy for apple maggot control. Journal of economic entomology. June 1989. v. 82 (3). p. 895-905. Includes references. (NAL Call No.: DNAL 421 J822).

0837

Relative susceptibility to slide-dip application of cyhexatin in three populations of Panoncyhus ulmi (Koch) in Virginia apple orchards.
Pfeiffer, D.G. Pfeiffer, S.W. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. Oct 1986. v. 3 (4). p. 326-328. (NAL Call No.: DNAL SB599.J69).

0838

Reproduction, development, and longevity of Pholetesor ornigis (Hymenoptera: Braconidae), a parasitoid of spotted tentiform leafminer (Lepidoptera: Gracillariidae), in the laboratory.
AESAAI. Ridgway, N.M. Mahr, D.L. Lanham, Md. : The Society. Annals of the Entomological Society of America. July 1990. v. 83 (4). p. 790-794. Includes references. (NAL Call No.: DNAL 420 EN82).

0839

Reproduction, development, longevity, and host mortality of Sympiesis marylandensis (Hymenoptera: Eulophidae), a parasitoid of spotted tentiform leafminer (Lepidoptera: Gracillariidae), in the laboratory.
AESAAI. Ridgway, N.M. Mahr, D.L. Lanham, Md. : The Society. Annals of the Entomological Society of America. July 1990. v. 83 (4). p. 795-799. Includes references. (NAL Call No.: DNAL 420 EN82).

0840

Resistance to methomyl in populations of the spotted tentiform leafminer (Lepidoptera: Gracillariidae) from southern Ontario.
JEENAI. Pree, D.J. Marshall, D.B.; Archibald, D.E. Lanham, Md. : Entomological Society of America. Laboratory bioassays with spotted tentiform leafminer, Phyllonorycter blancardella (F.), moths indicated the occurrence of 4-9-fold resistance to methomyl. Cross-resistance to oxamyl occurred at approximately the same levels. Resistance also occurred in larval stages. In the field, applications of methomyl timed for a predominance of early instars overcame resistance and were as effective as pyrethroids or diflubenzuron. Surveys in 1984 and 1986 indicated resistance was largely restricted to production areas in Norfolk County, Ontario, Canada. Journal of economic entomology. Apr 1990. v. 83 (2). p. 320-324. Includes references. (NAL Call No.: DNAL 421 J822).

0841

Resistance to pyrethroid insecticides in the spotted tentiform leafminer, Phyllonorycter blancardella (Lepidoptera: Gracillariidae), in southern Ontario.
JEENAI. Pree, D.J. Marshall, D.B.; Archibald, D.E. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1986. v. 79 (2). p. 318-322. Includes references. (NAL Call No.: DNAL 421 J822).

0842

Response of tufted apple bud moth (Lepidoptera: Tortricidae) neonates to selected insecticides.
JEENAI. Knight, A.L. Hull, L.A. Lanham, Md. : Entomological Society of America. Responses of tufted apple bud moth, Platynota idaeusalis (Walker), neonates in direct spray and leaf residue bioassays with the organophosphate azinphosmethyl, chlorpyrifos, microencapsulated methyl parathion, phosmet, and phosalone; the carbamates methomyl and thiodicarb; and the pyrethroid fenvalerate were measured for a laboratory strain and for populations collected from orchard at the Pennsylvania State University Fruit Research Laboratory in Adams County, Pa. The relative ranking of pesticide toxicity for the laboratory strain was similar in both bioassays: pyrethroid is greater than carbamates is greater than organophosphates. However, certain organophosphates such as chlorpyrifos and microencapsulated methyl parathion were much more effective in the leaf residue than direct spray tests. Highest resistance levels (field LC50/laboratory LC50) were found for the organophosphates in both tests (3- to 17-fold), especially with azinphosmethyl (17-fold). Carbamates and pyrethroids had low resistance levels (1- to 4-fold). Resistance levels to azinphosmethyl were high (17- to 24-fold) within commercial and experimental apple orchards scattered throughout Adams County. Journal of economic entomology. Aug 1989. v. 82 (4). p. 1027-1032. Includes references. (NAL Call No.: DNAL 421 J822).

0843

Robustness in empirically based binomial decision rules for integrated pest management.
JEENAI. Binns, M.R. Bostanian, N.J. Lanham, Md. : Entomological Society of America. An empirical linear relationship between log -log(PT) and log (m) has been shown to exist for samples from a wide variety of arthropod species; m is the mean and PT is defined as the probability of getting no more than a predetermined number (T) of individuals in a sample unit. Previously presented expressions for the variance of the predicted values of m have often omitted terms that should be present. One of these terms is shown to be

relatively large in relation to the whole, and the consequences of omitting the term are described. The operating characteristic curves for decision making (e.g., to spray with pesticide or not) based on the relationship are shown to be sensitive to such a term. Ways of minimizing its effect are described: choosing T so that the linear fit is best and choosing higher values of T. Such remedies must be balanced against the costs of using a high value of T. Journal of economic entomology. Apr 1990. v. 83 (2). p. 420-427. Includes references. (NAL Call No.: DNAL 421 J822).

0844

Role of predaceous ants in pear psylla (Homoptera: Psyllidae) management: estimating colony size and foraging range of Formica neoclara (Hymenoptera: Formicidae) through a mark-recapture technique.
JEENAI. Paulson, G.S. Akre, R.D. Lanham, Md. : Entomological Society of America. The foraging range of Formica neoclara (Emery) workers, determined through the use of a mark-release-recapture technique in which ants were marked with fast-drying enamel spray paint was approximately 7.6 m, with an estimated foraging area of 179 m2 per colony. Ants from a single nest foraged in as many as five trees. Ants from separate nests did not forage in the same trees, indicating that each colony had discrete foraging territories. Worker populations ranged from 500 to 24,500; approximately 28% of the worker population were foragers. Worker population was positively related to nest size. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1437-1440. Includes references. (NAL Call No.: DNAL 421 J822).

0845

San Jose scale (Homoptera: Diaspididae): simulation of seasonal phenology in North Carolina orchards.
EVETEX. McClain, D.C. Rock, G.C.; Stinner, R.E. Lanham, Md. : Entomological Society of America. Orchard temperatures and pheromone trap catch data and crawler hatch data for nine orchard-years were used to validate the accuracy of physiological time models in simulating the time intervals for one generation between male flight peaks, and crawler peaks, as well as the interval between male flight peaks and crawler peaks (embryonic development) of four seasonal generations of the San Jose scale, Quadraspidiotus pernicious (Comstock) in North Carolina orchards. Linear (degree-days) models simulated within +/- 1 wk the interval for all male flight peaks between overwintering and F1 generations, while a nonlinear model simulated within +/- 1 wk all but one male flight peak between overwintering and F1 generations. The models were less accurate for simulating intervals of flight peaks between F1 to F2 and F2 to F3 generations. Likewise, model simulations of the time interval for one generation between crawler hatch peaks, and the time required for embryonic development, were more accurate for F1 and F2 than F3 and F4 generations. Simulation results of the linear and nonlinear models were similar with 40 of the 49 simulations comparing linear versus nonlinear models not differing by more than 6 d of each other. Validation of the models for San Jose scale was complicated in one apple orchard by the presence of Forbes scale, Quadraspidiotus forbesi (Johnson). Environmental entomology. Aug 1990. v. 19 (4). p. 916-925. Includes references. (NAL Call No.: DNAL QL461.E532).

0846

Seasonal changes in resightings of marked, wild Rhagoletis pomonella (Diptera: Tephritidae) flies in nature.
FETMA. Dpp, S.B. Prokopy, R.J. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Dec 1987. v. 70 (4). p. 449-456. Includes references. (NAL Call No.: DNAL 420 F662).

0847

Seasonal studies of grape phylloxera, green June beetle and grape berry moth.
Johnson, D.T. Domek, J.; Mayes, R.L.; Lewis, B.A. Fayetteville, Ark. : Arkansas State Horticultural Society. Proceedings of the ... annual meeting - Arkansas State Horticultural Society. 1986. (107th). p. 133-139. Includes references. (NAL Call No.: DNAL SB21.A7A7).

0848

Seasonality of catch of pear psylla Cacopsylla pyricola (Homoptera: Psyllidae) on yellow traps.
EVETEX. Krysan, J.L. Horton, D.R. Lanham, Md. : Entomological Society of America. Sampling of summer form and winter form pear psylla, Cacopsylla pyricola (Foerster), was undertaken during four years and in two orchards using three methods: yellow sticky traps, clear sticky traps, and beating tray (limb jar techniques). Catches on yellow and clear sticky traps were positively correlated; correlations between trap catches and beating tray numbers tended to be nonsignificant. Catch of summer forms and fall populations of winter forms was much greater on yellow traps than on clear traps. In early spring (before bud break) clear traps captured as many or more psylla than yellow traps; but yellow traps caught far more psylla as green tissue appeared on pear trees. Differences in numbers caught on the two colors were larger for traps hung at the higher of two heights; however, in percentage terms (percentage of total captures occurring on yellow), no position effects were noted. Catches of spring populations of winter forms on sticky traps were highly biased toward male psylla. Similar trends in sex ratio bias were noted for the earliest spring beating tray samples; male bias decreased on successive sampling dates. Environmental entomology. Apr

1991. v. 20 (2). p. 626-634. Includes references. (NAL Call No.: DNAL QL461.E532).

0849

Seasonality of mating and ovarian development in overwintering Cacopsylla pyricola (Homoptera: Psyllidae).
EVETEX. Krysan, J.L. Higbee, B.S. Lanham, Md. : Entomological Society of America. Pear psylla, Cacopsylla pyricola (Foerster), overwinters as an adult in reproductive diapause that is initiated and maintained by short photoperiod. In autumn, females have immature ovaries and few are mated. Coincident with warm field termperatures in late winter, their ovaries mature and most of them become mated. The mean number of spermatophores per female varied from 5.3 to 16.5 (range, 0-63) among populations from three orchards sampled in the spring. Newly emerged laboratory-reared winterform (diapause) males have active sperm in the testes and seminal vesicles. In autumn, field-collected winterform males have sperm in the siminal vesicles, but the rate of insemination of females is very low if males are held in the laboratory under short photoperiod of 10:14 (L:D). The rate of insemination increases greatly after such males are conditioned at a long photoperiod of 16:8 (L:D) for about 10 d. As winter progresses, there is a decrease in the duration of the conditioning required to permit mating. The ability of males to mate with females appears to be under control of the diapause syndrome. Environmental entomology. June 1990. v. 19 (3). p. 544-550. Includes references. (NAL Call No.: DNAL QL461.E532).

0850

Seasonality of mating and reproduction in pear psylla.
WSEPA. Krysan, J.L. Higbee, B.S. Pullman, Wash. : The Society. Proceedings of the Washington State Entomological Society. Meeting held on April 23 and September 17, 1988, Yakima, Washington. 1988. (50). p. 866. (NAL Call No.: DNAL QL461.W3).

0851

Selective control program for the pear pest complex in southern Oregon.
JEENAI. Westigard, P.H. Gut, L.J.; Liss, W.J. College Park, Md. : Entomological Society of America. Journal of economic entomology. Feb 1986. v. 79 (1). p. 250-257. Includes references. (NAL Call No.: DNAL 421 J822).

0852

Sensitivity of tufted apple budmoth (Lepidoptera: Tortricidae) larval instars to photoperiodic induction of diapause at 21C.
GENSAB. Rock, G.C. Tifton, Ga. : The Society. Journal of Entomological Science. Apr 1985. v. 20 (2). p. 143-145. Includes references. (NAL Call No.: DNAL QL461.G4).

0853

Sequential classification of prey/predator ratio with application to European red mite (Acari: Tetranychidae) and Typhlodromus pyri (Acari: Phytoseiidae) in New York apple orchards.
JEENAI. Nyrop, J.P. Lanham, Md. : Entomological Society of America. A sequential sampling procedure for calssifying the ratio of prey/predators with respect to a critical ratio was developed. This procedure was combined with a sequential density classification procedure for use in sampling European red mite (Panonychus ulmi (Koch)) and a phytoseiid predator, Typhlodromus pyri (Scheuten) in New York apple orchards. Use of the sequential procedure would result in greater than or equal to 40% savings in sample size for many prey and predator densities. Frequencies of erroneous classification were similar for the sequential procedure and a fixed sample size procedure that used the maximum number of samples that might be taken when using the sequential method. To use the sequential ratio classification procedure, variance-mean models for the prey and predator are required as well as knowledge of the correlation between these two populations. Sensitivity analysis showed that the procedure, as applied to European red mite and T. pyri, is robust with respect to variation in this correlation. Journal of economic entomology. Feb 1988. v. 81 (1). p. 14-21. Includes references. (NAL Call No.: DNAL 421 J822).

0854

Sex pheromone components of the oblique-branded leafroller, Choristoneura rosaceana in the Okanagan Valley of British Columbia.
JCECD. Vakenti, J.M. Gaunce, A.P.; Slessor, K.N.; King, G.G.S.; Allan, S.A.; Madsen, H.F.; Borden, J.H. New York, N.Y. : Plenum Press. Journal of chemical ecology. Feb 1988. v. 14 (2). p. 605-621. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0855

Simulated spotted tentiform leafminer injury and its influence on growth and fruiting of apple trees.
JOSHB. Kappel, F. Proctor, J.T.A. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Jan 1986. v. 111 (1). p. 64-69. Includes 24 references. (NAL Call No.: DNAL 81 SO12).

0856

Site selection for oviposition and larval feeding by the tufted apple bud moth (Lepidoptera: Tortricidae) on apple in Pennsylvania.
JESCEP. Meagher, R.L. Jr. Hull, L.A. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1991. v. 26 (1). p. 149-156. Includes references. (NAL Call No.: DNAL QL461.G4).

0857

SN 72129 and avermectin B1, two new pesticides for control of pear psylla, Psylla pyricola (Homoptera: Psyllidae).
JEENAI. Burts, E.C. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1985. v. 78 (6). p. 1327-1330. Includes references. (NAL Call No.: DNAL 421 J822).

0858

Some apple insects of Connecticut /by G.H. Lamson.
Lamson, G. H. 1882-1931. Storrs, Conn. : Storrs Agricultural Experiment Station, 1912. Cover title. p. 48-83 : ill. ; 23 cm. (NAL Call No.: DNAL 100 C76S no.71).

0859

Some effects of parental rearing conditions and age on progeny birth weight, growth, development, and reproduction in the apple aphid, Aphis pomi (Homoptera: Aphididae).
EVETEX. Carroll, D.P. Hoyt, S.C. College Park, Md. : Entomological Society of America. Environmental entomology. June 1986. v. 15 (3). p. 614-619. Includes references. (NAL Call No.: DNAL QL461.E532).

0860

Spatial and seasonal distribution of damage to apples by Argyrotaenia citrana (Fernald) and Pandemis pyrusana Kearfott.
Zalom, F. Pickel, C. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. Jan 1988. v. 5 (1). p. 11-15. Includes references. (NAL Call No.: DNAL SB599.J69).

0861

Spatial dispersion and sampling of Campylomma verbasci (Heteroptera: Miridae) on apple.
EVETEX. Thistlewood, H.M.A. Lanham, Md. : Entomological Society of America. The spatial dispersion of Campylomma verbasci (Meyer) on apple was determined in 166 sets of limb-tap samples from 11 commercial and 4 research orchards. The data were compared for fit to the Poisson and negative binomial distributions and described using Iwao's regression technique and Taylor's power law. C. verbasci was moderately aggregated on apple; the basic components of the population were groups of nymphs or single adults. Taylor's coefficients, a = 1.686 and b = 1.284, were used as a basis for sampling, and optimal sample sizes of 47, 29, and 19 taps per 0.5 ha of orchard were calculated for densities of 1, 2, and 4 nymphs per tap, respectively. A fixed precision level sampling plan and a sequential decision plan were developed for rapid estimation of population densities within apple orchards. Environmental entomology. June 1989. v. 18 (3). p. 398-402. Includes references. (NAL Call No.: DNAL QL461.E532).

0862

Spatial dynamics and sampling of Lyonetia speculella (Lepidoptera: Lyonetiidae), a leafminer of apple.
EVETEX. Brown, M.W. Lanham, Md. : Entomological Society of America. The abundance of Lyonetia speculella Clemens larvae on each tree of a 1.25-ha apple orchard, planted in 1986, was determined monthly from June to September 1986 and May to September 1987. In both years, the abundance of L. speculella was low initially, increased in early summer, remained constant through midsummer, and increased again at the end of the summer. L. speculella abundance per tree was aggregated, but the distribution of infested trees was initially random, then regular for the remainder of each year. The initial increase in abundance was caused by an increase in the percentage of the trees infested and the late summer increase by an increase in aggregation on infested trees. There were differences in distribution of mines between Northern Spy' and Red Delicious' because of phenological and growth habit differences between the two cultivars. An application of oxamyl in 1986 temporarily altered the spatial distribution of L. speculella, increasing the aggregation and decreasing the percentage of the trees infested for the sample following oxamyl application. A graph of the relationship between sample size and sampling precision is provided to estimate required sample size for future studies. Random, systematic, random cluster, and systematic cluster sampling designs were all equally effective in simulated sampling from the field data. Environmental entomology. Oct 1989. v. 18 (5). p. 895-880. Includes references. (NAL Call No.: DNAL QL461.E532).

0863

Spatial scale of fenvalerate resistance in pear psylla (Homoptera: Psyllidae) and its relationship to treatment history.
JEENAI. Tabashnik, B.E. Croft, B.A.; Rosenheim, J.A. Lanham, Md. : Entomological Society of America. Data on fenvalerate susceptibility, pyrethroid use, and related information for 48 sites in British Columbia, Washington, Oregon, and California were analyzed to clarify the

spatial scale and causes of fenvalerate resistance in pear psylla, Psylla pyricola Foerster. LC50's for fenvalerate varied significantly among regions and subregions. The number of pyrethroid treatments per site explained a significant portion of the variation in fenvalerate LC50 over all sites, within regions, and within subregions. For a given number of pyrethroid treatments, the expected LC50 for fenvalerate varied significantly among regions and subregions. Within-season timing of pyrethroid treatments, continuity of pyrethroid use, intensity of pear production in the surrounding area, and number of pyrethroid treatments at neighboring sites were not significantly associated with LC50's for fenvalerate. Prospects for managing resistance to fenvalerate are best in Oregon and California (where levels of resistance were generally lower) compared with Washington and British Columbia. Results showing that local variation in LC50 for fenvalerate was significantly associated with local variation in pyrethroid use suggest that growers can reduce local increases in resistance by limiting pyrethroid treatments. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1177-1183. Includes references. (NAL Call No.: DNAL 421 J822).

0864

Special apple insect problems and controls.
MUCBA. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Dec 1986. (E-154). p. 27-28. (NAL Call No.: DNAL 275.29 M58B).

0865

Spectral response of the compound eye of the wild and laboratory-reared apple maggot fly, Rhagoletis pomonella.
Agee, H.R. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. Apr 1985. v. 2 (2). p. 147-154. ill. Includes references. (NAL Call No.: DNAL SB599.J69).

0866

Spider mite management on pome fruits, revisited: organotin and acaricide resistance management.
JEENAI. Croft, B.A. Hoyt, S.C.; Westigard, P.H. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1987. v. 80 (2). p. 304-311. Includes references. (NAL Call No.: DNAL 421 J822).

0867

Spraying apple orchards for insects and fungi /by B.S. Pickett.
Pickett, B. S. 1882-. Urbana, Ill. : University of Illinois Agricultural Experiment Station, 1908. Cover title. 36 p. : ill. ; 23 cm. Includes bibliographical references. (NAL Call No.: DNAL 275.29 IL62C no.120).

0868

Spring migration, within-orchard dispersal, and apple-tree preference of plum curculio (Coleoptera: Curculionidae) in southern Quebec.
JEENAI. Lafleur, G. Hill, S.B. Lanham, Md. : Entomological Society of America. Labeled (65Zn) adult plum curculio (PC), Conotrachelus nenuphar (Herbst), that migrated to adjacent woodlots in fall 1982 reinfested the orchard in spring 1983. Spring migration is thought to include both a mass migration in a preferred direction (the reverse of fall migration direction) and an exploratory component by which PC seek optimal feeding and oviposition sites. A northwestern tendency was observed among PC migrating in one orchard in spring. PC were most active between 12 May (before tight cluster) and 27 June (June drop), with the highest speed of dispersion (4.4 m per insect per day) at fruit set. After emergence and migration to host trees, PC were found on the ground under apple trees, individually and in groups of up to 14 with equal numbers of each sex. As the growing season progressed, PC moved from outside rows adjacent to woodlots toward the center of the orchard, possibly searching for food, oviposition sites, and trees offering sufficient protection from desiccation. PC were more abundant in the southeastern part of the orchard and on early cultivars of trees with dense foliage. Implications for control and future research are discussed. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1173-1187. Includes references. (NAL Call No.: DNAL 421 J822).

0869

Spring migration, within-orchard dispersal, and apple-tree preference of Plum Curculio (Coleoptera: Curculionidae) in southern Quebec.
JEENAI. Lafleur, G. Hill, S.B. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1173-1187. maps. Includes references. (NAL Call No.: DNAL 421 J822).

0870

Stability of cyhexatin resistance in field populations of European red mite (Acari: Tetranychidae).
JEENAI. Welty, C. Reissig, W.H.; Dennehy, T.J.; Weires, R.W. Lanham, Md. : Entomological Society of America. Two field populations of European red mite, Panonychus ulmi (Koch), that were resistant to cyhexatin were exposed for 2

yr to three different levels of selection pressure by cyhexatin to determine whether resistance was stable under field conditions. Populations of European red mites from field plots where pressure with cyhexatin was intensive, limited, or absent were periodically tested for susceptibility to cyhexatin residues with a 24-h leafless bioassay technique. By late in the second year, mites from the plot where no cyhexatin had been applied were as susceptible to cyhexatin in bioassay as mites from the intensively treated plot. After at least 10 generations without selection pressure, the frequency of mites that were phenotypically resistant to cyhexatin appeared to be stable in these populations. Journal of economic entomology. June 1989. v. 82 (3). p. 692-697. Includes references. (NAL Call No.: DNAL 421 J822).

0871

Statistical methods for analyzing discrete responses of insects tested repeatedly.
EVETEX. Stanek, E.J. III. Diehl, S.R.; Dgetluck, N.; Stokes, M.E.; Prokopy, R.J. Lanham, Md. : Entomological Society of America. A common study design in entomology involves repeated measurement of a binary-response variable on a set of individual insects or populations under different treatment conditions. An appropriate analysis of such data will allow patterns over time to be compared between experimental groups, while accounting for the correlations among the repeated tests of individuals or populations. We illustrate such an analysis using weighted least squares methods for repeated measurement of oviposition respones of Rhagoletis pomonella (Walsh) adult female flies to two types of test fruit at four ages. We tested for differences in host acceptance behavior of adult flies originating as larvae from naturally infested apple versus hawthorn fruit, and effect (if any) of fly age on this difference. Techniques for model development, analysis of correlation structure, and hypothesis testing are presented. In the particular study considered, there was evidence of a linear increase over age in oviposition propensity for three of four larval-origin/test-fruit groups. The difference between flies of apple versus hawthorn larval origin when tested on apples was shown to be age-dependent, whereas the difference in response to hawthorn was consistent over the range of ages tested in this study. These methods are appropriate for a variety of experimental designs commonly used in toxicological, physiological, behavioral, ecological, and genetic studies of insects. Environmental entomology. Apr 1987. v. 16 (2). p. 319-326. Includes references. (NAL Call No.: DNAL QL461.E532).

0872

Study of female sex pheromone of leopard moth, Zeuzera pyrina L.: isolation and identification of three components.
JCECD. Tonini, C. Cassani, G.; Massardo, P.; Guglielmetti, G.; Castellari, P.L. New York, N.Y. : Plenum Press. Journal of chemical ecology. Includes statistical data. June 1986. v. 12 (6). p. 1545-1558. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0873

Study of spiders which control numbers of pests on apple trees.
Anchipanova, Ya.Ya. New York, N.Y. : Allerton Press. Soviet agricultural sciences. Translated from: Vsesoiuznaia akademiia sel'skokhoziaistvennykh nauk, Doklady, (11), 1986, p. 46-48. (20 AK1). 1986. (11). p. 78-80. Includes references. (NAL Call No.: DNAL S1.S68).

0874

A summary of research on synthetic pyrethroids and mites in the apple orchard ecosystem.
OARCB. Hall, F.R. Wooster, Ohio : The Center. Research circular - Ohio Agricultural Research and Development Center. July 1986. (290). p. 49-51. Includes references. (NAL Call No.: DNAL 100 OH3R).

0875

Summer evaluation of hexythiazox and clofentezine against three spider mite species in North Carolina apple orchards.
Rock, G.C. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. Jan 1987. v. 4 (1). p. 55-60. Includes references. (NAL Call No.: DNAL SB599.J69).

0876

Survival of European red mite on apples with different levels of susceptibility to powdery mildew.
HJHSA. Goonewardene, H.F. Kwolek, W.F.; Williams, E.B. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1986. v. 21 (5). p. 1222-1224. Includes references. (NAL Call No.: DNAL SB1.H6).

0877

Susceptibility of Malus spp. to the apple blotch leafminer (Lepidoptera: Gracillariidae).
EVETEX. Alm, S.R. Weires, R.W.; Lamb, R.C.; Nielsen, R.A.; Vankirk, J.R. College Park, Md. : Entomological Society of America. Environmental entomology. June 1985. v. 14 (3).

p. 228-230. Includes references. (NAL Call No.: DNAL QL461.E532).

0878

Susceptibility of selected shade and flowering trees to gypsy moth (Lepidoptera: Lymantriidae).
JEENAI. Peterson, N.C. Smitley, D.R. Lanham, Md. : Entomological Society of America. Twenty-one shade and flowering trees were planted in a cultivated opening surrounded on three sides by gypsy moth-infested forest stands. Three Malus cultivars, Salix babylonica, Acer platanoides 'Royal Red' and 'Crimson Sentry,' and Prunus cerasifera 'Thundercloud' were the most heavily defoliated (30-70%) each year. Acer rubrum 'Northwood' and 'October Glory,' Tilia cordata 'Greenspire,' and Tilia americana suffered low to moderate defoliation (4-20%). Acer platanoides 'Emerald Queen,' Acer saccharinum, Fraxinus pennsylvanica 'Marshall Seedless,' Platanus X acerifolia 'Bloodgood,' Pyrus calleryana 'Redspire,' Acer platanoides 'Deborah,' Prunus serrulata 'Kwanzan,' Gleditsia triacanthos var. imermis 'Sunburst,' and Magnolia X soulangiana lost <4.0% of their foliage because of gypsy moth feeding injury. A wide range of host plant resistance levels among cultivars of A. platanoides and species of Acer and Prunus indicates a need for evaluating cultivars of shade trees susceptible to gypsy moth. In a separate study at the same site, Acer rubrum 'Northwood' planted in the cultivated opening was more heavily defoliated (14.4%) by gypsy moth larvae than similar trees planted in the adjacent forest stand (6.6%). Journal of economic entomology. Apr 1991. v. 84 (2). p. 587-592. Includes references. (NAL Call No.: DNAL 421 J822).

0879

Susceptibility to hexythiazox of eggs and larvae of European red mite (Acari: Tetranychidae).
JEENAI. Welty, C. Reissig, W.H.; Dennehy, T.J.; Weires, R.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1988. v. 81 (2). p. 586-592. Includes references. (NAL Call No.: DNAL 421 J822).

0880

Techniques to measure azinphosmethyl resistance in Platynota idaeusalis (Lepidoptera: Tortricidae).
JEENAI. Meagher, R.L. Jr. Hull, L.A. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1986. v. 79 (4). p. 1130-1133. Includes references. (NAL Call No.: DNAL 421 J822).

0881

Temperature-dependent models for simulating nondiapause development in Platynota idaeusalis (Lepidoptera: Tortricidae) in North Carolina.
EVETEX. Boyne, J.V. Rock, G.C.; Stinner, R.E. College Park, Md. : Entomological Society of America. Environmental entomology. Dec 1985. v. 14 (6). p. 785-789. Includes references. (NAL Call No.: DNAL QL461.E532).

0882

Temperature integrator reduces spraying.
AGREA. Sherman, H. Washington, D.C. : The Administration. Agricultural research - U.S. Department of Agriculture, Agricultural Research Service. Jan 1986. v. 34 (1). p. 14. (NAL Call No.: DNAL 1.98 AG84).

0883

Temporal distribution of Phyllonorycter elmaella (Lepidoptera: Gracillariidae) and its major parasitoid, Pnigalio flavipes (Hymenoptera: Eulophidae), in Washington apple orchards.
EVETEX. Barrett, B.A. Brunner, J.F. Lanham, Md. : Entomological Society of America. Environmental entomology. Apr 1990. v. 19 (2). p. 362-369. Includes references. (NAL Call No.: DNAL QL461.E532).

0884

Temporal variability in repeated bioassays of field populations of European red mite (Acari: Tetranychidae): implications for resistance monitoring.
JEENAI. Martinson, T.E. Nyrop, J.P.; Denndhy, T.J.; Reissig, W.H. Lanham, Md. : Entomological Society of America. Discrimination bioassays are increasingly being used to detect resistance and estimate the frequency (F) of resistant (R) phenotypes in field populations. The proportion of survivors in discriminating bioassays is thought to measure the frequency of R phenotypes in the population. External factors that cause physiological stress in a field population may alter response to a discriminating concentration and affect estimates of F. Because susceptible (S) phenotypes already die at the discriminating concentration, only the response of R phenotypes changes. Thus, estimates of F will be biased and populations under stress will appear to be more susceptible than they really are. Repeated discriminating bioassays of the European red mite, Panonychus ulmi (Koch), showed variability in estimates of F. Repeated bioassays of P. ulmi from commercial apple orchards were used to construct a cumulative distribution function that describes the probability that R phenotypes die in the discriminating bioassay. This distribution function was then used in simulations to explore the effect of day-to-day variability in tolerance of R phenotypes on resistance

monitoring programs. Journal of economic entomology. Aug 1991. v. 84 (4). p. 1119-1127. Includes references. (NAL Call No.: DNAL 421 J822).

0885

Ten-striped June beetle.
ALMFA. Van Steenwyk, B. Rough, D. Sacramento, Calif. : California Almond Growers Exchange. Almond facts. Mar/Apr 1986. v. 51 (2). p. 31. ill. (NAL Call No.: DNAL 280.28 AL62).

0886

Thermal and thermoperiodic effects on larval and pupal development and survival in tufted apple bud moth (Lepidoptera: Tortricidae).
EVETEX. Rock, G.C. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1985. v. 14 (5). p. 637-640. Includes references. (NAL Call No.: DNAL QL461.E532).

0887

Three common insect pests of western Washington /by W.H. Lawrence.
Lawrence, William Hurford, 1877-. Pullman, Wash. : Washington State Agricultural College and School of Science, Experiment Station, 1904. Cover title. 14 p. ; 22 cm. (NAL Call No.: DNAL 100 W27E no.65).

0888

Timing of mite injury affects the bloom and fruit development of apple.
JEENAI. Beers, E.H. Hull, L.A. Lanham, Md. : Entomological Society of America. The time when injury by the European red mite, Panonychus ulmi (Koch), occurs on an apple tree was studied to determine if yield components and vegetative growth were affected. Apple trees were subjected to about 1,000 cumulative mite days at three different times: early season (early May to mid-June), midseason (mid-June to 1 August), and late season (1 August to mid-October). Midseason injury resulted in the greatest reduction in mean fruit weight at harvest as well as return bloom and fruit load the following season. Late-season injury resulted in a reduction of return bloom. Early-season injury did not result in significant differences from the control for any of the response variables measured. On defruited trees, return bloom, percentage of set, and fruit load were not affected by early-season mite injury of the previous year. Percentage of set was not related to early-season injury occurring the same year. Journal of economic entomology. Apr 1990. v. 83 (2). p. 547-551. Includes references. (NAL Call No.: DNAL 421 J822).

0889

Timing treatments for apple maggot (Diptera: Tephritidae) control using sticky sphere traps baited with synthetic apple volatiles.
JEENAI. Stanley, B.H. Reissig, W.H.; Roelofs, W.L.; Schwarz, M.R.; Shoemaker, C.A. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1987. v. 80 (5). p. 1057-1063. Includes references. (NAL Call No.: DNAL 421 J822).

0890

Toxicity of avermectin B1 to San Jose scale (Homoptera: Diaspididae) crawlers, and effects on orchard mites by crawler sprays compared with full-season applications.
JEENAI. Pfeiffer, D.G. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1985. v. 78 (6). p. 1421-1424. Includes references. (NAL Call No.: DNAL 421 J822).

0891

Toxicity of slide dip application of five insecticides to apple aphid and spirea aphid (Homoptera: Aphididae).
JESCEP. Hogmire, H.W. Brown, M.W.; Crim, V.L. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1990. v. 25 (1). p. 10-15. Includes references. (NAL Call No.: DNAL QL461.G4).

0892

Transitional step toward second-stage integrated management of arthropod pests of apple in Massachusetts orchards.
JEENAI. Prokopy, R.J. Christie, M.; Johnson, S.A.; O'Brien, M.T. Lanham, Md. : Entomological Society of America. The practice of integrated pest management (IPM) may occur at multiple levels and at more than one stage within a level. In managing arthropod pests of apple, we consider the first stage of the first level (first-stage IPM) to be the use of multiple integrated approaches for determining need and optimal timing of application of a single technique of pest control: sprays of toxic pesticide. We consider the second stage of the first level (second-stage IPM) to be fully integrated use of multiple techniques of pest control, including behavioral, cultural, biological, and pesticidal methods. As a transitional step to eventual use of all components of a second-stage IPM approach, we evaluated application of insecticide every 3 wk (beginning in early July) to apple trees at the perimeter of orchards as a substitute for use of interception traps for behavioral control of immigrating apple maggot flies, Rhagoletis pomonella (Walsh). Remaining second-stage IPM components were implemented, with the orchard interior free of insecticide and acaricide application after early June. Results over 3 yr (1987-1989) in six commercial orchard test

blocks of about 1 ha each showed that fruit injury by apple maggot was about the same during the first 2 yr in test blocks as in nearby control blocks sprayed under grower-implemented first-stage IPM practices. In the third year, however, injury in the test blocks was significantly greater, Teaching 1.2%. Fruit injury by Lepidoptera and other summer pests was very low in all blocks in all years (0-0.3%). Except for mites (which were not always effectively controlled in test blocks by predators), populations of other principal foliar pests were little different in test blocks compared with control blocks. Average annual costs of insecticide and acaricide applications were about $310 and $470 per hectare in test and control blocks, respectively. We conclude that restricting insecticide application to perimeter row apple trees after early June. Journal of economic entomology. Dec 1990. v. 83 (6). p. 2405-2410. Includes references. (NAL Call No.: DNAL 421 J822).

0893

Transplanting ants to pear orchards for psylla control.
WUEXA. Akre, R.D. Paulson, G.S. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. In subseries: Insect Answers. Aug 1991. (1590). 4 p. (NAL Call No.: DNAL 275.29 W27P).

0894

Trap moths effectively.
Willoughby, Ohio : Meister Publishing Company. American fruit grower. June 1985. v. 105 (6). p. 35. ill. (NAL Call No.: DNAL 80 G85).

0895

The tufted apple budmoth.
Walgenbach, J.F. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. Jan 1990. (422). 2 p. Includes references. (NAL Call No.: DNAL S544.3.N6N62).

0896

Tufted apple budmoth (Lepidoptera: Tortricidae): simulation of postdiapause development and prediction of spring adult emergence in North Carolina.
EVETEX. Stinner, R.E. Rock, G.C.; Bacheler, J.E. College Park, Md. : Entomological Society of America. In-orchard temperatures and pheromone trap catch data for 21 orchard-year (1976-80) combinations were used to compare the accuracy of physiological time models in simulating and predicting male spring emergence of the tufted apple budmoth, Platynota idaeusalis (Walker), in North Carolina apple orchards. By starting model simulations at the date in which larval postdiapause development was calculated to begin, linear (degree-day) and nonlinear models were accurate within +/- 1 wk in simulating spring flight peaks for 19 and 20 of the 21 orchard-year combinations, respectively. Nonlinear models predict the male spring flight peaks with an accuracy of +/- 1 wk simulated 5-22 d in advance by using actual orchard temperatures during the first 70% postdiapause development of P. idaeusalis and then using 5-yr (1976-80) average hourly orchard temperatures thereafter. Environmental entomology. Apr 1988. v. 17 (2). p. 271-274. Includes references. (NAL Call No.: DNAL QL461.E532).

0897

Tufted apple budmoth (Lepidoptera: Tortricidae): simulation of within-season phenology in North Carolina.
EVETEX. Stinner, R.E. Rock, G.C.; Bacheler, J.E. College Park, Md. : Entomological Society of America. In-orchard temperatures and pheromone trap catch data for 21 orchard-year (1976-80) combinations were used to compare the accuracy of physiological time models in simulating and predicting the time intervals between male flight peaks of bivoltine populations of the tufted apple budmoth, Platynota idaeusalis (Walker), in North Carolina apple orchards. Linear models (degree days) were not accurate within +/- 1 wk for simulating the time intervals between flight peaks for more than 16 of the 21 orchard-year combinations. A nonlinear model simulates within +/- 1 wk the interval between flight peaks for 20 of the 21 orchard-year combinations provided that the time of the peak of the first flight is known, the model simulates two generations rather than one, and orchard temperatures are known. The nonlinear model predicts (+/- 1 wk accuracy) second flight peaks several weeks in advance by using actual orchard temperatures during the first 80% of P. idaeusalis development and then using 5-yr (1976-80) average hourly orchard temperatures during the final 20% of development. Environmental entomology. Apr 1988. v. 17 (2). p. 266-270. Includes references. (NAL Call No.: DNAL QL461.E532).

0898

Types of parasitoid-induced mortality, host stage preferences, and sex ratios exhibited by Pnigalio flavipes (Hymenoptera: Eulophidae) using Phyllonorycter elmaella (Lepidoptera: Gracillariidae) as a host.
EVETEX. Barrett, B.A. Brunner, J.F. Lanham, Md. : Entomological Society of America. The different types of parasitoid-induced mortality, host stage preferences, and sex ratio exhibited by Pnigalio flavipes (Ashmead) to its host, Phyllonorycter elmaella Doganlar & Mutuura, was investigated in commercial apple orchards in central Washington. The parasitoid-induced mortality of Phyllonorycter elmaella consisted on average of 57.2% host

stinging with oviposition, 32.7% host feeding, and 10.1% host stinging without oviposition. Pnigalio flavipes laid eggs on Phyllonorycter elmaella tissue feeders (fourth and fifth instars) an average of 5.4 times more than it did on sap feeders (first-third instars), but host-fed on sap feeders an average of 12.1 times more than on tissue feeders. When healthy tissue feeders became scarce later in the season, Pnigalio flavipes began to lay eggs on previously attacked tissue feeders (superparasitize) and then switched to laying eggs on sap feeders. The sex ratio (M:F) of Pnigalio flavipes reared from tissue feeders was almost 1 to 1. Only male Pnigalio flavipes were reared from sap feeders. Environmental entomology. June 1990. v. 19 (3). p. 803-807. Includes references. (NAL Call No.: DNAL QL461.E532).

0899

Understanding the apple maggot.
UTSCB. Davis, D.W. Jones, V.P. Logan : The Station. Utah Science - Utah Agricultural Experiment Station. Fall 1986. v. 47 (3). p. 94-97. ill., maps. (NAL Call No.: DNAL 100 UT1F).

0900

Use of sex pheromone traps to monitor azinphosmethyl resistance in tufted apple bud moth (Lepidoptera: Tortricidae).
JEENAI. Knight, A.L. Hull, L.A. Lanham, Md. : Entomological Society of America. The use of sex pheromone traps to monitor the susceptibility of adult male tufted apple bud moths, Platynota idaeusalis (Walker), to azinphosmethyl was investigated in laboratory experiments and field trials in a number of apple orchards in southcentral Pennsylvania and West Virginia. Two techniques were compared: the topical treatment of males caught on the trap's sticky surface and the incorporation of the insecticide directly into the adhesive. For both techniques, the site of application (dorsal compared with ventral), the duration of the assay, and the sex of the insect were important in laboratory experiments. However, moth age and mating status were not significant factors in topical application bioassays. Compared with the laboratory strain, LD50's of populations from apple orchards were 2 to 8 times greater in the topical application bioassays and 6 to 18 times greater in the adhesive incorporation assay. Significant changes in male response to azinphosmethyl were found among broods in some orchards. These changes appeared to be correlated with the seasonal insecticide use patterns. Topical application bioassays indicated a sublethal effect from prior field insecticide sprays up to 2 d after application. Journal of economic entomology. Aug 1989. v. 82 (4). p. 1019-1026. Includes references. (NAL Call No.: DNAL 421 J822).

0901

Use of sticky traps and limb jarring to aid in pest management decisions for summer populations of the pear psylla (Homoptera: Psyllidae) in Connecticut.
JEENAI. Adams, R.G. Los, L.M. Lanham, Md. : Entomological Society of America. Effectiveness of Lightning Yellow sticky traps for monitoring summer populations of adult pear psylla, Psylla pyricola Foerster, was evaluated at three heights, three orientations, and in four quadrants of pear trees. Traps placed at a height of 1.2 to 1.8 m aboveground in the south quadrant of pear trees were more significantly correlated with pear psylla egg and nymph infestations than other trap positions tested. Vertically positioned traps captured significantly more pear psylla than horizontal traps. Trap captures from all orientations were significantly correlated with egg and nymph infestations. Relationships between trap and limb jarring counts of adults and infestations of eggs and nymphs were determined by regression analyses. Both adult monitoring methods were equally effective in predicting shoot infestations of eggs and nymphs. The action thresholds for either eggs or nymphs were very similar. Based on the nymph data, action thresholds of 4.4 to 6.9 pear psylla per trap per day or 1.0 to 1.2 per limb jar are suggested for adult monitoning. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1448-1454. Includes references. (NAL Call No.: DNAL 421 J822).

0902

Use of thematic mapper data for the detection of forest damage caused by the pear thrips.
RSEEA. Vogelmann, J.E. Rock, B.N. New York, N.Y. : Elsevier Science Publishing. Remote sensing of environment. Dec 1989. v. 30 (3). p. 217-225. ill., maps. Includes references. (NAL Call No.: DNAL Q184.R4).

0903

Using pear cultivars in the management of the pear pest complex.
PWHAA. Westigard, P. Sugar, D.; Gonzalves, P.; Hilton, R. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1989. (85th). p. 206-209. ill. (NAL Call No.: DNAL 81 W273).

0904

Validation of injury thresholds for European red mite (Acari: Tetranychidae) on 'Yorking' and 'Delicious' apple.
JEENAI. Hull, L.A. Beers, E.H. Lanham, Md. : Entomological Society of America. Injury thresholds for the European red mite, Panonychusulmi (Koch), were validated for two major apple (Malus X domestica Borkhauser)cultivars, 'Yorking' and 'Delicious,' in Pennsylvania. Four target

injury thresholds (0,250, 750, and 1,250 cumulative mite days CMD per leaf) were established on trees for 1 or 2 yr.Most of mite injury occurred during July and August. Effects of injury were determinedon mean fruit weight, soluble solids, fruit firmness, fruit color, as well as returnbloom, percentage of fruit set, and fruit load the year following injury. Only the target injurythreshold level of 1,250 CMDs caused any reduction in yield variables, and this occurred onlyduring the year after mite injury. These reductions occurred for return bloom, percentage offruit set, and return fruit load and only for the cultivar 'Yorking.' Mite injury had no effectduring current season. Adoption of an injury threshold of 750 CMDs is proposed for applesin Pennsylvania. Hypotheses are presented to help explain differences in results ofour study compared with those of previous studies. Journal of economic entomology. Oct 1990. v. 83 (5). p. 2026-2031. Includes references. (NAL Call No.: DNAL 421 J822).

0905

Variation in host fruit volatiles attractive to apple maggot fly, Rhagoletis pomonella.
JCECD. Carle, S.A. Averill, A.L.; Rule, G.S.; Reissig, W.H.; Roelofs, W.L. New York, N.Y. : Plenum Press. Journal of chemical ecology. Apr 1987. v. 13 (4). p. 795-805. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0906

Visual monitoring trap for the apple blotch leafminer moth, Phyllonorycter crataegella (Lepidoptera: Gracillariidae).
EVETEX. Green, T.A. Prokopy, R.J. College Park, Md. : Entomological Society of America. Environmental entomology. June 1986. v. 15 (3). p. 562-566. Includes references. (NAL Call No.: DNAL QL461.E532).

0907

White apple leafhopper.
PWHAA. Beers, E.H. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1988. (84th). p. 99-101. (NAL Call No.: DNAL 81 W273).

0908

Within-tree spatial patterns of Platynota idaeusalis (Lepidoptera: Tortricidae) on two apple cultivars.
EVETEX. Meagher, R.L. Jr. Hull, L.A. College Park, Md. : Entomological Society of America. Environmental entomology. June 1987. v. 16 (3). p. 786-790. Includes references. (NAL Call No.: DNAL QL461.E532).

0909

1986 commercial apple spray guide.
Gorsuch, C.S. Miller, R.W. Clemson, S.C. : The Service. Information card - Clemson University. Cooperative Extension Service. Jan 1986. (110,rev.). 8 p. (NAL Call No.: DNAL 275.29 S08I).

0910

1988 commercial apple. Insect, disease & weed control guide.
McVay, J.R. Gazaway, W.; Powell, A.; Latham, A.J.; Kouskolekas, C.A.; Patterson, M.G.; Everest, J.W.; . Auburn, Ala. : The Service. Circular ANR - Cooperative Extension Service, Auburn University. In subseries: Integrated Pest Management. Jan 1988. (11). 12 p. ill. (NAL Call No.: DNAL S544.3.A2C47).

0911

1988 Illinois commercial tree fruit spray schedules / prepared by S.M. Ries ... et al. .
Ries, S. M. Urbana : Cooperative Extension Service, University of Illinois at Urbana-Champaign, 1988 . Abstract: This guide for commercial tree fruit growers includes 1988 Illinois tree fruit spray schedules and pesticide recommendations for apple, peach, cherry, pear and plum crops. It provides information on fungicide, insecticide and muticide harvest restrictions, mouse and weed control, growth regulators, chemical thinning, pesticide handling, safety, and Integrated Pest Management (IPM). Cover title.~ "January, 1988"--P. 4 of cover.~ "C-1151 S.". 40 p. ; 28 cm. (NAL Call No.: DNAL SB608.F8N56).

0912

1989 commercial apple spray guide.
Miller, R.W. Gorsuch, C.S. Clemson, S.C. : The Service. Information card - Clemson University, Cooperative Extension Service. Jan 1989. (110,rev.). 12 p. (NAL Call No.: DNAL 275.29 S08I).

0913

Control of dagger and lesion nematodes in apple and plum orchards with fenamiphos, carbofuran, and carbosulfan.
PLDIDE. Rosenberger, D.A. Meyer, F.W. St. Paul, Minn. : American Phytopathological Society. Plant disease. June 1988. v. 72 (6). p. 519-522. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0914

Controlling apple replant disease in 'McIntosh' apple trees on various rootstocks.
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Soil disinfection and monoammonium phosphate fertilization increase precocity of apples on replant problem soils.
JOSHB. Neilsen, G.H. Yorston, J. Alexandria, Va. : The Society. In an apple (Malus domestica Borkh.) orchard with a severe replant problem, tree size was increased by the 2nd year and number of fruit by the 3rd year by treating the planting hole soil with formalin or mancozeb plus monoammonium phosphate (MAP) fertilizer. Growth increases were evident each year for 4 years only for the MAP + formalin treatment. In a second orchard, with a less severe replant problem, planting-hole treatment with formalin or dazomet + MAP increased tree size by year 2. Number of fruit in year 2 was increased by formalin and mancozeb + NM treatments, although this effect persisted in year 3 only for mancozeb + MAP. Leaf P concentrations were increased to high values in the first year by NM fertilization but declined in subsequent years. Leaf Mn concentration also increased in oneorchard, a consequence of fertilizer-induced acidification of planting hole soil and Mn uptake from the fungicide mancozeb. Journal of the American Society for Horticultural Science. July 1991. v. 116 (4). p. 651-654. Includes references. (NAL Call No.: DNAL 81 SO12).

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Pickel, C. Bethell, R.S. Berkeley, Calif. : The Service. Leaflet - University of California, Cooperative Extension Service. Dec 1985. (21412). 4 p. (NAL Call No.: DNAL S544.3.C2C3).

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PHYTAJ. Janisiewicz, W.J. Roitman, J. St. Paul, Minn. : American Phytopathological Society. Control of gray mold, caused by Botrytis cinerea, and reduction in blue mold, caused by Penicillium expansum, was obtained on Golden Delicious apples and Bosc pears protected with Pseudomonas cepacia isolated from apple leaves. The bacterium strongly inhibited fungal growth during in vitro screening on nutrient yeast dextrose agar medium. An effective antifungal compound was isolated from the bacterial cells and culture medium. This compound, identified as a pyrrolnitrin, inhibited growth of both fungi at a concentration of 1 mg/L during an agar diffusion test in vitro. Complete control of gray mold was obtained on apples and pears protected with a pyrrolnitrin concentration of 10 mg/L at a pathogen inoculum level of 10(3)-10(5) conidia/ml. Blue mold was controlled at the same concentration of pyrrolnitrin at inoculum concentrations of 10(3) conidia/ml for pears and 10(3) and 10(4) conidia/ml for apples. At concentrations of 50 mg/L or higher, complete control was obtained of both diseases on both fruits at all tested inoculum levels. Phytopathology. Dec 1988. v. 78 (12,pt.2). p. 1697-1700. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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NEMFA. Cooley, D.R. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1986. v. 92. p. 72-75. ill. (NAL Call No.: DNAL 81 M384).

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Simpson, R.C. Emmaus, Pa. : Rodale Press. Rodale's organic gardening. Apr 1986. v. 33 (4). p. 68. ill. (NAL Call No.: DNAL S605.5.R64).

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Collar rot of pome and stone fruits.
WUEXA. Grove, G.G. Johnson, D.A.; Covey, R.P. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. In subseries: Plant Diseases. Aug 1988. (1497). 4 p. ill. (NAL Call No.: DNAL 275.29 W27P).

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Collar rot threatens fledgling apple industry.
Kingdon, L. Phoenix, Ariz. : Elliott L. Cushman. Arizona farmer-stockman. Apr 1985. v. 64 (4). p. 45. (NAL Call No.: DNAL 6 AR44).

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Commercial apple insect and disease control--1991.
Von Broembsen, S. Coppock, S.; Taylor, G. Stillwater, Dkla. : The Service. DSU current report - Dklahoma State University, Cooperative Extension Service. Feb 1991. (6241). 6 p. (NAL Call No.: DNAL S451.D5D8).

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Control of apple scab and powdery mildew with fungicides applied on a protective schedule, 1984.
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Control of arthropods on apple, Malus X domestica (Borkh.), selections for scab (Ascomycetes: Mycosphaerellacea) and apple maggot (Diptera: Tephritidae) resistance in an orchard in Indiana.
JEENAI. Goonewardene, H.F. Pliego, G.; McCabe, G.P.; Howard, P.H.; Oliver, P.J. Lanham, Md. : Entomological Society of America. Three years of sampling an apple orchard with seven selections resistant to apple scab, Venturia inaequalis (Cke.) Wint., five of which were also resistant to apple maggot, Rhagoletis pomonella (Walsh), growing on three different rootstocks (EMVII, MM1106, and MM111), indicated a faunal composition consisting of eight orders from which 31 taxa in 21 families were identified. Among the 14 most frequently found groups in descending frequency were aphids, Aphis pomi De Geer and Dysaphis plantaginea Passerini; leafminer, Phyllonorycter blancardella (F.); plum curculio, Conotrachelus nenuphar (Herbst); codling moth, Cydia pomonella (L.); ants, Lasius neoniger (Emery) and Prenolepis imparis (Say); leafhoppers, Empoasca maligna Walsh, Jikradia olitoria (Say), Penthimia americana (Fitch), Scaphytopius sp., and Typhlocyba pomaria McAtee; tarnished plant bug, Lygus lineolaris (Palisot de Beauvois); green fruitworm, Lithophane antennata (Walker); flea beetle genera (unidentified); ladybird beetles, Adalia bipunctata (L.), Anatis sp., Brachiacantha ursina (F.), Coleomegilla maculata lengi Timberlake, Hippodamia convergens Guerin-Meneville, Myzia pullata (Say), and Olla v. nigrum Mulsant; apple maggot, Rhagoletis pomonella (Walsh); redbanded leafroller, Argyrotaenia velutinana (Walker); lacewing, Chrysopa carnea (Stevens); and green stink bug, Acrosternum hilare (Say). Direct inverse relationships were found between numbers of identified pests and predators. Significant differences in the incidence of arthropods were found among rootstocks and among selections. Based on these findings, we used a modified program of insecticides only (azinphosmethyl and carbaryl and fenvalerate and phosmet with water as the control applied 9, 36, and 81 d after full bloom), and obtained greater than or equal to 80% fruit without any, arthropod damage. The total crop was evaluated from fruit set to harvest. The cost of chemicals per hectare for the azinphosmethyl and carbaryl program was $83.40;. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1426-1436. Includes references. (NAL Call No.: DNAL 421 J822).

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Control of arthropods on apple selections with scab (Ascomycetes: Mycophaerellacea) and European red mite (Acari: Tetranychidae) resistance.
JEENAI. Goonewardene, H.F. Pliego, G.; McCabe, G.P.; Howard, P.H.; Oliver, P.J. Lanham, Md. : Entomological Society of America. Use of pest and disease resistant cultivars in pest management is an alternative to commercial apple production that depends on use of chemical pesticides. Over a 3-yr period, we produced fruit that were 86% free of damage by key pests using selections with apple scab, Venturia inaequalis (Cke.) Wint, and European red mite, Panonychus ulmi (Koch) resistance and three critically timed sprays of either fenvalerate or phosmet. Although we did not use one, a fungicide may be needed to produce fruit that would grade well if summer diseases, Gloedes pomogena (Schw.) Colby and Leptothyrium pomi (Mont. & Fr.) Sacc. are a problem. The management program for these resistant selections produced a crop of undamaged fruit comparable with one that would be produced with a calendar-based spray program on commercially grown cultivars susceptible to pests and diseases. The cost of a program including eight sprays of insecticides, fungicides, and acaricides recommended in Indiana for apple production is $1,387.48 per season per hectare for cultivars not resistant to pests. This cost was reduced to $84.90 with phosmet or $240.00 per hectare with fenvalerate for the season when resistant selections were used. Summer disease control was not considered in our investigation but, if needed, two sprays of fungicide would cost $77.40 per season per hectare. Fruit damage related to rootstock or selection differences (or both) previously reported were not found, suggesting perhaps a masking of such effects by pesticide. Journal of economic entomology. Feb 1990. v. 83 (1). p. 180-188. Includes references. (NAL Call No.: DNAL 421 J822).

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Effect of interrupted wetness periods on spore germination and apple infection by Botryosphaeria obtusa.
PHYTA. Arauz, L.F. Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. Conidia of Botryosphaeria obtusa were allowed to germinate in water for 4 hr at 24 C, were air-dried, and were rewetted following dry periods ranging from 0 to 8 hr. No increase in germ tube length was observed 4 hr after rewetting in any treatment. Mean germ tube length was similar (approximately 126 micrometer) for all drying treatments. Mean germ tube length was 532 micrometer when conidia were allowed to germinate in water for 8 hr without interruption. Apple seedlings were inoculated with conidia of B. obtusa in aqueous suspension and were exposed to 24-hr wetness periods, which were interrupted after 12 hr for 1, 2, 3, and 4 hr. Infection of apple foliage stopped irreversibly with interruptions of 1 or more hr in the wetness period. Interruptions as short as 1 hr also resulted in reduced infection of fruit. Phytopathology. Nov 1990. v. 80 (11). p. 1218-1220. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Effect of phytotoxins produced by Botryosphaeria obtusa, the cause of black rot of apple fruit and frogeye leaf spot.
PHYTA. Venkatasubbaiah, P. Sutton, T.B.; Chilton, W.S. St. Paul, Minn. : American Phytopathological Society. Botryosphaeria obtusa, which causes black rot of apple fruit and frogeye leaf spot, produced phytotoxins in culture, infected fruit, and spore germination fluids. Mellein was the most abundant toxin isolated from the culture fluid. Other toxins isolated were tyrosol, 4-hydroxymellein, 5-hydroxymellein, and 4-hydroxybenzaldehyde. Seventeen apple cultivars and eight weed species were used in a leaf bioassay to determine phytotoxicity of the toxins. The apple cultivars, Supergold and Silverspur, were highly sensitive to all toxins. Only three apple cultivars showed moderate resistance to most toxins. There was no correlation between isolate pathogenicity and the amount of toxin production in culture. Among the weed species, prickly sida and morning glory were very sensitive. Extraction of fruit infected with B. obtusa yielded all toxins except 4-hydroxybenzaldehyde. When conidial germination fluids were extracted with solvent, mellein and 4-hydroxymellein could be detected

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PLDRA. Spotts, R.A. Cervantes, L.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1986. v. 70 (4). p. 305-306. Includes 16 references. (NAL Call No.: DNAL 1.9 P69P).

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Effects of mixtures of benomyl and mancozeb on buildup of benomyl-resistant Venturia inaequalis.
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Effects of postinfection applications of ergosterol biosynthesis-inhibiting fungicides on lesion formation and pseudothecial development of Venturia inaequalis.
PHYTA. O'Leary, A.L. Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Jan 1986. v. 76 (1). p. 119-124. ill. Includes 14 references. (NAL Call No.: DNAL 464.8 P56).

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Evaluation of flowering crabapple susceptibility to apple scab in Ohio--1989.
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FNETO. Yoder, K.S. Cochran, A.E. II; Warren, J.R.; Gray, N.H.; Schmidt, C.M. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 24. (NAL Call No.: DNAL 464.9 AM31R).

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Evaluation of fungicides and fungicide combinations for control of apple scab, fly speck and sooty blotch, 1984.
FNETO. Ellis, M.A. Madden, L.V.; Wilson, L.L. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1985. v. 40. p. 5-6. (NAL Call No.: ONAL 464.9 AM31R).

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FNETD. Stuckey, R.E. Hartman, J.R.; Clinton, W.; Evans, M. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 28-29. (NAL Call No.: DNAL 464.9 AM31R).

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FNETD. Burr, T.J. Smith, C.A.; Seem, R.C.; Disbros, L.D. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 11. (NAL Call No.: DNAL 464.9 AM31R).

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Evaluation of fungicides for control of apple diseases in Missouri, 1985.
FNETD. Shaffer, W.H. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 20-21. (NAL Call No.: DNAL 464.9 AM31R).

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Evaluation of fungicides for control of apple scab and powdery mildew, 1985.
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FNETD. Washington, W.S. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 3-4. (NAL Call No.: DNAL 464.9 AM31R).

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Evaluation of fungicides for control of collar rot, 1984 and 1985.
FNETD. Berkett, L.P. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 2. (NAL Call No.: DNAL 464.9 AM31R).

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Evaluation of fungicides for disease control on apple in Missouri, 1984.
FNETD. Shaffer, W.H. Krause, G.F.; Dropkin, V.H. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1985. v. 40. p. 21-22. (NAL Call No.: DNAL 464.9 AM31R).

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Evaluation of fungicides for post infection activity against apple scab, 1984.
FNETD. Burr, T.J. Smith, C.A.; Davids, A.J. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1985. v. 40. p. 1. (NAL Call No.: DNAL 464.9 AM31R).

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Evaluation of fungicides on a protective spray schedule for control of apple scab and mildew, 1985.
FNETD. Burr, T.J. Smith, C.A.; Seem, R.C.; Disbrow, L.D. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 10. (NAL Call No.: DNAL 464.9 AM31R).

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Evaluation of metalaxyl and captafol soil drenches, composted hardwood bark soil amendments, and graft union placement on control of apple collar rot.
PLDRA. Ellis, M.A. Ferree, D.C.; Madden, L.V. St. Paul, Minn. : American Phytopathological Society. Plant disease. Jan 1986. v. 70 (1). p. 24-26. Includes 16 references. (NAL Call No.: DNAL 1.9 P69P).

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Evaluation of SAT applications of benzimidazole fungicides in combination with adjuvants for apple scab control, 1984.
FNETD. Caldwell, D.L. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 166. (NAL Call No.: DNAL 464.9 AM31R).

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Evaluation of sterol-inhibiting fungicides applied 72-hours after infection, 1985.
FNETD. Jones, A.L. Ehret, G.R.; Comstock, R.E. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 15. (NAL Call No.: DNAL 464.9 AM31R).

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Evaluation of Trichoderma spp. for biological control of Phytophthora crown and root rot of apple seedlings.
PHYTA. Roiger, D.J. Jeffers, S.N. St. Paul, Minn. : American Phytopathological Society. In a greenhouse bioassay, 223 isolates of five species of Trichoderma were evaluated as biological control agents of Phytophthora crown and root rot of apple seedlings. Effects of inoculum rate and ambient temperature on seedling mortality caused by Phytophthora cactorum were determined. Isolates of Trichoderma spp. were evaluated with two delivery methods. A viscous suspension of conidia in an aqueous gel was applied to seedling roots, or a colonized mixture of peat and wheat bran (peat-bran) was added to soil. After all isolates were evaluated twice with both delivery methods, six isolates delivered in peat-bran and five isolates delivered as conidium suspensions had increased survival time of seedlings compared with treatments without Trichoderma spp. These 11 treatments then were compared in a separate experiment. Isolate TW.055 of T. virens (= Gliocladium virens) in peat-bran consistently was superior to all other treatments; seedlings survived an average of 30 (out of 44) days whereas those in the control survived only 19 days. Isolates TW.105 and TW.189 of T. koningii in peat-bran (both with an average seedling survival time of 24 days) and a conidium suspension of isolate TW.138 of T. harzianum (with an average seedling survival time of 22 days) were effective in most trials. Trichoderma spp. were promising as biological control agents of Phytophthora crown and root rot of apple seedlings under experimental conditions conducive to disease development and, therefore, should be pursued as a potential means of biological control of the disease on apple trees in the orchard. The bioassay developed to evaluate isolates of Trichoderma spp. was effective and probably could be adapted to evaluate other microorganisms for potential to control Phytophthora crown and root rot of apple trees. Phytopathology. Aug 1991. v. 81 (8). p. 910-917. Includes references. (NAL Call No.: DNAL 464.8 P56).

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FNETD. Zehr, E.I. Kirby, G.W.; Foster, D.H. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1985. v. 40. p. 32-33. (NAL Call No.: DNAL 464.9 AM31R).

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Factors affecting dispersal of Mucor piriformis in pear orchards and into the packinghouse.
PLDRA. Michailides, T.J. Spotts, R.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1986. v. 70 (11). p. 1060-1063. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Factors affecting release of ascospores by the pear scab fungus (Venturia pirina).
PLDRA. Latorre, B.A. Yanez, P.; Rauld, E. St. Paul, Minn. : American Phytopathological Society. Plant disease. Mar 1985. v. 69 (3). p. 213-216. ill. Includes 10 references. (NAL Call No.: DNAL 1.9 P69P).

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Factors influencing antagonism of Chaetomium globosum to Venturia inaequalis: a case study in failed biocontrol.
PHYTAJ. Boudreau, M.A. Andrews, J.H. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Oct 1987. v. 77 (10). p. 1470-1475. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Field susceptibility of scab-resistant apple cultivars and selections to cedar apple rust, quince rust and hawthorn rust.
FVRJA. Warner, J. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1990. v. 44 (4). p. 216-225. Includes references. (NAL Call No.: DNAL 80 F9464).

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Field susceptibility of 68 apple cultivars to cedar apple rust, quince rust and hawthorn rust.
FVRJA. Warner, J. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1992. v. 46 (1). p. 6-10. Includes references. (NAL Call No.: DNAL 80 F9464).

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Flowering crab apple tree.
Fiala, J.L. Washington, D.C. : The Office. A new variety of crab apple tree, which I call "Doubloons", has large white double flowers, a generally round habit of growth with upright spreading dense branches and yellow fruit. The new variety is resistant to apple scab. Plant patent - United States Patent and Trademark Office. Apr 10, 1990. (7216). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

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Foliar antagonists: status and prospects.
Lindow, S.E. Orlando, Fla. : Academic Press, 1985. Biological control in agricultural IPM systems / edited by Marjorie A. Hoy, Donald C. Herzog. Paper presented at the "Symposium on Biological Control in Agricultural Integrated Pest Management Systems" June 4-6, 1984, held at the Citrus Research and Education Center, University of Florida, at. p. 395-413. Includes references. (NAL Call No.: DNAL SB933.3.B548).

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Forecasting ascospore dose of Venturia inaequalis in commercial apple orchards.
PHYTA. Gadoury, D.M. MacHardy, W.E. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Jan 1986. v. 76 (1). p. 112-118. ill. Includes 38 references. (NAL Call No.: DNAL 464.8 P56).

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HJHSA. Lamb, R.C. Aldwinckle, H.S.; Terry, D.E. Alexandria, Va. : American Society for Horticultural Science. HortScience. Aug 1985. v. 20 (4). p. 774-775. ill. Includes 3 references. (NAL Call No.: DNAL SB1.H6).

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Fungi, leaves, and the theory of island biogeography.
MCBEBU. Andrews, J.H. Kinkel, L.L.; Berbee, F.M.; Nordheim, E.V. New York : Springer-Verlag New York. Microbial ecology. 1987. v. 14 (3). p. 277-290. Includes references. (NAL Call No.: DNAL QR100.M5).

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Fungicide test on apple scab, 1985.
FNETD. Hildebrand, P.D. Newbery, R.J.; Ross, R.G. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 15. (NAL Call No.: DNAL 464.9 AM31R).

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Germination and appressorium formation by Venturia inaequalis during infection of apple seedling leaves.
PLDRA. Turner, M.L. MacHardy, W.E.; Gadoury, D.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1986. v. 70 (7). p. 658-661. Includes 21 references. (NAL Call No.: DNAL 1.9 P69P).

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In vitro activity of etaconazole, bitertanol, and fenarimol on fungi causing summer diseases of apples.
PLDRA. Sutton, T.B. Nardacci, J.F.; O'Leary, A.L. St. Paul, Minn. : American Phytopathological Society. Plant disease. Aug 1985. v. 69 (8). p. 700-703. ill. Includes 22 references. (NAL Call No.: DNAL 1.9 P69P).

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In vitro reaction between apple pollen and apple scab fungus (Venturia inaequalis Cke. Wint.).
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In vitro testing of the reaction of apple rootstocks to Phytophthora cactorum.
FVRJA. Barritt, B.H. Covey, R.P.; Dilley, M.A. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1990. v. 44 (1). p. 23-25. Includes references. (NAL Call No.: DNAL 80 F9464).

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Incidence and development of apple scab on fruit during the late summer and while in storage /by Cyril O. Bratley.
Bratley, C. O. 1903-1948. Washington : U.S. Dept. of Agriculture, 1937. Caption title. 46 p. : ill. ; 23 cm. Literature cited: p. 43-45. (NAL Call No.: DNAL 1 Ag84Te no.563).

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Incidence of scab and mildew on trees sprayed with sterol-inhibiting fungicides for post-infection control of scab, 1985.
FNETD. Hickey, K.D. May, J.; Garretson, M. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological

Society. 1986. v. 41. p. 13. (NAL Call No.: DNAL 464.9 AM31R).

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Indiana commercial tree fruit spray schedules 1986 / prepared by David L. Matthew ... et al. .
Matthew, David L. West Lafayette, IN : Cooperative Extension Service, Purdue University, 1986? . Abstract: This guide for commercial tree fruit growers includes 1986 Indiana tree fruit spray schedules and pesticide recommendations for apple, peach, cherry, pear and plum crops. It provides information on mite, mouse and weed control, growth regulators, chemical thinning, pesticide handling, safety, and Integrated Pest Management (IPM). 37 p. ; 28 cm. (NAL Call No.: DNAL 275.29 In2Id no.168).

1099

Influence of temperature and moisture on germination of ascospores and conidia of Botryosphaeria obtusa.
PHYTA. Arauz, L.F. Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. Maximum germination of conidia of Botryosphaeria obtusa occurred in free water and declined as relative humidity (RH) was reduced from 100 to 92%; no germination was observed at 88.5% RH. Germination in free water reached 80% in 4 hr at 16-32 C and in 12 hr at 12 C but was only 23 and 0% at 8 and 4 C, respectively, after 12 hr. Higher temperatures were required for germination at 95 and 92% RH (16 and 28 C, respectively) than at 98, 99, and 100% RH (12 C). Conidial germination at 92% RH was observed only after 12 hr at 28 C. The two isolates tested differed in temperature and relative humidity requirements for germination. Requirements for ascospore germination were similar to those for conidia. Germ tube lengths of ascospores and conidia were maximum in free water and decreased with decreasing relative humidity. After 12 hr in free water, ascospore germ tubes reached a maximum mean length of 0.78 mm at 28 C, whereas maximum conidial germ tube length was 0.82 mm at 24 C for isolate 087 and 0.99 mm at 28 C for isolate 049. Germ tube length of both types of spores declined at 32 C. Phytopathology. June 1989 v. 79 (6). p. 667-674. Includes references. (NAL Call No.: DNAL 464.8 P56).

1100

The influence of temperature and moisture on the quantitative production of pseudothecia of Venturia inaequalis.
PHYTA. O'Leary, A.L. Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Feb 1986. v. 76 (2). p. 199-204. Includes 11 references. (NAL Call No.: DNAL 464.8 P56).

1101

Influence of temperature and wetness duration on infection of immature apple and pear fruit by Phytophthora cactorum.
PHYTA. Grove, G.G. Boal, R.J. St. Paul, Minn. : American Phytopathological Society. Phytophthora cactorum was recovered from irrigation water from late June to September 1989 and early June to September 1990. Apple (cv. Golden Delicious) and pear (cv. Bartlett) fruit inoculated with a zoospore suspension (10,000/ml) of P. cactorum were used to determine the effect of wetness duration and temperature on disease severity and incidence. In controlled environment studies, incidence and severity increased with increased wetness duration (1-12 h) at temperatures between 10 and 30 C on pears and 7 and 30 C on apples. On pears, the loss threshold of one lesion per fruit required wetness durations of 5, 4, and 3 h at 15, 20, and 25-30 C, respectively. At 20-30 C, a greater than or equal to 3-h wetness duration resulted in 100% infection on pears. On apples, the loss threshold of one lesion per fruit required 11-, 7-, 6-, 5-, and 3-h wetness durations at 10, 15, 20, 25, and 30 C, respectively. Wetness durations of 6-7 and 34 h were required for 100% infection at 15-20 and 25-30 C, respectively. Multiple regression equations using temperature and wetness duration as independent variables adequately described disease incidence and severity on both hosts. In orchard studies on pears, infection increased with increased wetness duration (1-20 h) and temperatures up to about 28 C, and then declined slightly at longer wetness durations at 29-31 C. Infection of apples in the field increased with increased wetness duration (1-20 h) up to 20-25 C and then declined. Multiple regression equations using temperature and wetness duration, and temperature, wetness duration, and increasing day of year as independent variables adequately described disease incidence and severity on pears and apples, respectively. The predicted loss threshold of one lesion per fruit on orchard-inoculated pears required wetness durations of 1, 3, 6, and 6-11 h at 25, 20, 15, and 10 C, respectively; on apples the loss threshold ranged from 6 h at 10 and 27.5 C to 3.5 h at 20 C. Susceptibility o. Phytopathology. Nov 1991. v. 81 (11). p. 1465-1471. Includes references. (NAL Call No.: DNAL 464.8 P56).

1102

Inhibition of pseudothecial development of Venturia inaequalis by the basidiomycete Athelia bombacina in apple leaf litter.
PHYTA. Young, C.S. Andrews, J.H. St. Paul, Minn. : American Phytopathological Society. An immunocytochemical stain was developed to detect the basidiomycete Athelia bombacina in apple leaf litter. The polyclonal antibodies for A. bombacina were sufficiently specific that only hyphae of this fungus were detected in immunocytochemically treated sections of dead leaves inoculated with A. bombacina. Apple leaves naturally infected with Venturia inaequalis were inoculated with A. bombacina,

incubated outside from November 1986 to May 1987, and sampled monthly. Sections stained immunocytochemically showed that A. bombacina grew endophytically and epiphytically. The antagonist prevented neither growth of hyphae of V. inaequalis into the interior of leaves, nor initiation of pseudothecia. There was no particular spatial association between hyphae of the two fungi, nor any sign of direct parasitism of hyphae or pseudothecia of V. inaequalis. Pseudothecia in leaves with the antagonist did not mature further than the stage of producing pseudoparaphyses, reaching an average of 84 micrometer in length. Pseudothecia in leaves without A. bombacina developed asci normally and were 108 micrometer long by 1 May. These data were confirmed by results from an abbreviated sampling scheme of McIntosh apple leaves during 1987-1988 and by observations of pseudothecial inhibition in crab apple leaves following delayed application of the antagonist. Phytopathology. June 1990. v. 80 (6). p. 536-542. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1103

Integrated management of postharvest diseases.
NEMFA. Rosenberger, D.A. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held on February 1-2, 1989, Sturbridge, Massachusetts. Feb 1989. v. 95. p. 106-112. Includes references. (NAL Call No.: DNAL 81 M384).

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Interactions between actinomycete-like organisms and young apple roots grown in soil conducive to apple replant disease.
PHYTAJ. Westcott, S.W. III, Beer, S.V. Israel, H.W. St. Paul, Minn. : American Phytopathological Society. Phytopathology. July 1987. v. 77 (7). p. 1071-1077. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Investigating physical modes of action of tree fruit fungicides.
Szkolnik, M. St. Paul, Minn. : APS Press, c1986. Methods for evaluating pesticides for control of plant pathogens / edited by Kenneth D. Hickey ; prepared jointly by the American Phytopathological Society and the Society of Nematologists. p. 98-101. ill. Includes references. (NAL Call No.: DNAL SB960.M47 1986).

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Isozyme variability among isolates of Phytophthora megasperma.
PHYTA. Nygaard, S.L. Elliott, C.K.; Cannon, S.J.; Maxwell, D.P. St. Paul, Minn. : American Phytopathological Society. Isozyme analysis was used to study over 300 field isolates of the species Phytophthora. Interspecific diversity for isozyme banding was identified among the four species assayed, P. megasperma, P. cactorum, P. cryptogea, and P. parasitica var. nicotianae. Intraspecific isozyme diversity was present among isolates of P. megasperma that were recovered from 10 host plant species and from many geographical origins; these isolates represented many morphological types and included the three formae speciales of P. megasperma (f. sp. glycinea, f. sp. medicaginis, and f. sp. trifolii). Isozyme analysis separated P. megasperma isolates into at least six intraspecific groups: the three P. megasperma formae speciales--glycinea, medicaginis, and trifolii--and the apple/apricot/cherry, Douglas fir, and broad host-range groups. These groups parallel those previously reported in the literature. The broad host-range group was further divided into at least three subgroups by isozyme analysis. All of the 224 isolates of P. m. f. sp. glycinea and 41 of the 45 isolates of P. m. f. sp. medicaginis had identical isozyme banding patterns within their respective formae speciales. Isolates of P. m. glycinea and P. m. medicaginis baited from the same geographical sites had no intra-formae speciales variant or intermediate banding patterns. This, and evidence previously reported, lead us to conclude that the two formae speciales, P. m. medicaginis and P. m. glycinea, are not naturally intermating populations and that they exist as two biological species distinct from other P. megasperma isolates. Phytopathology. July 1989. v. 79 (7). p. 773-780. Includes references. (NAL Call No.: DNAL 464.8 P56).

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MARY BLITE: a predictive model for apple fire blight disease management.
ARHMA. Steiner, P.W. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1987. (117th). p. 44-50. Includes references. (NAL Call No.: DNAL 81 M58).

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Methods for field evaluation of fungicides for control of foliar and fruit diseases of apple.
Hickey, K.D. Yoder, K.S.; Zehr, E.I. St. Paul, Minn. : APS Press, c1986. Methods for evaluating pesticides for control of plant pathogens / edited by Kenneth D. Hickey ; prepared jointly by the American Phytopathological Society and the Society of Nematologists. p. 116-119. Includes references. (NAL Call No.: DNAL SB960.M47 1986).

1109

Microbial introductions to apple leaves: influences of altered immigration on fungal community dynamics.
MCBEBU. Kinkel, L.L. Andrews, J.H.; Nordheim, E.V. New York, N.Y. : Springer-Verlag. Microbial ecology. 1989. v. 18 (2). p. 161-173. Includes references. (NAL Call No.: DNAL QR100.M5).

1110

Modeling aerial dispersal of the apple scab fungus.
FOPSA. Aylor, D.E. New Haven, Conn. : The Station. Frontiers of plant science - Connecticut Agricultural Experiment Station. Fall 1990. v. 43 (1). p. 6-8. Includes references. (NAL Call No.: DNAL 100 F92).

1111

Negative geotropism in Venturia inaequalis.
PHYTAJ. Gadoury, D.M. MacHardy, W.E. St. Paul, Minn. : American Phytopathological Society. Phytopathology. July 1985. v. 75 (7). p. 856-859. ill. Includes 13 references. (NAL Call No.: DNAL 464.8 P56).

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A new chlorinated phenylpyrrole antibiotic produced by the antifungal bacterium Pseudomonas cepacia.
JAFCAU. Roitman, J.N. Mahoney, N.E.; Janisiewicz, W.J.; Benson, M. Washington, D.C. : American Chemical Society. A group of chlorinated phenylpyrrole derivatives was isolated from a strain of Pseudomonas cepacia collected from apple leaves during a screening program designed to detect agents for biological control of fruit spoilage fungi. One of these substances, 2,3-dichloro-4-(2-amino-3-chlorophenyl)pyrrole, has not been previously reported. In vitro testing showed that all four of the phenylpyrroles had antifungal activity toward several fruit pathogens. The new phenylpyrrole showed fungal inhibitory effects on Golden Delicious apples inoculated with conidia of pathogenic organisms. An unrelated but known compound, 2-(2-heptenyl)-3-methyl-4(1H)-quinolone, was also isolated. Journal of agricultural and food chemistry. Feb 1990. v. 38 (2). p. 538-541. Includes references. (NAL Call No.: DNAL 381 J8223).

1113

The new generation of disease resistant apples.
NEMFA. Lamb, R.C. Livermore, K.G. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 102-106. (NAL Call No.: DNAL 81 M384).

1114

New, non-fungicidal techniques to aid in the management of apple scab.
NEMFA. MacHardy, W.E. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 75-78. (NAL Call No.: DNAL 81 M384).

1115

A new plant growth regulator of microbial origin.
CHNCA8. Voblikova, V.D. Kobrina, N.S.; Gerasimova, N.M.; Pavlova, Z.N.; Dem'yanova, G.F.; Murygina, V.P.; Volosova, L.I.; Muromtsev, G.S. New York, N.Y. : Consultants Bureau. Chemistry of natural compounds. Translated from: Khimiia prirodnykh soedinenii, p. 387-391. (QD241.K45). May/June 1985. v. 21 (3). p. 362-365. Includes 7 references. (NAL Call No.: DNAL QD241.K453).

1116

No carcinogen/zero residue production system for apples.
ARHMA. Jones, A.L. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 176-180. (NAL Call No.: DNAL 81 M58).

1117

Orchard diseases and fungicide update.
ARHMA. Jones, A.L. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1987. (117th). p. 58-60. (NAL Call No.: DNAL 81 M58).

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Parasitic fitness and intrastrain diversity of benomyl-sensitive and benomyl-resistant subpopulations of Venturia inaequalis.
PHYTAJ. Lalancette, N. Hickey, K.D.; Cole, H. Jr. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Nov 1987. v. 77 (11). p. 1600-1606. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Patterns of ascospore discharge by Venturia inaequalis.
PHYTAJ. MacHardy, W.E. Gadoury, D.M. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Oct 1986. v. 76 (10). p. 985-990. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Perennial canker and bull's eye rot of apples.
WUEXA. Maloy, O.C. Covey, R.P. Jr. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. In subseries: Plant Diseases. Apr 1989. (1517). 2 p. ill. (NAL Call No.: DNAL 275.29 W27P).

1121

Performance of scab resistant apple cultivars at the Smithfield Experimental Farm.
FVRJA. Warner, J. Potter, C. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1988. v. 42 (3). p. 96-102. Includes references. (NAL Call No.: DNAL 80 F9464).

1122

Persistence and control of benomyl tolerant apple scab, 1981.
FNETD. Washington, W.S. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 23. (NAL Call No.: DNAL 464.9 AM31R).

1123

Persistence of captan on apples, grapes, and pears in Ontario, Canada, 1981-1983.
JAFCAU. Frank, R. Northover, J.; Braun, H.E. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. May/June 1985. v. 33 (3). p. 514-518. Includes references. (NAL Call No.: DNAL 381 J8223).

1124

Pesticide use and levels of insect and scab injury on fruit in Nova Scotia apple orchards.
JEENAI. Hardman, J.M. Rogers, R.E.L.; MacLellan, C.R. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1987. v. 80 (4). p. 979-984. Includes references. (NAL Call No.: DNAL 421 J822).

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Pests not known to occur in the United States or of limited distribution. 76. A fruit brown rot.
Chang, L.W.H. Hyattsville, Md. : The Service. APHIS 81 - U.S. Department of Agriculture, Animal and Plant Health Inspection Service. Sept 1986. (49). 14 p. ill., maps. Includes references. (NAL Call No.: DNAL aSB599.A3U5).

1126

Phenotype patterns of benomyl-resistant isolates of Venturia inaequalis in eight orchards in British Columbia, Canada.
PLDIDE. Sholberg, P.L. Yorston, J.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. June 1991. v. 75 (6). p. 616-619. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1127

Phytophthora crown rot of apple trees: sources of Phytophthora cactorum and P. cambivora as primary inoculum.
PHYTAJ. Jeffers, S.N. Aldwinckle, H.S. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Mar 1988. v. 78 (3). p. 328-335. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1128

Phytophthora root and crown rot of apple trees in Arizona.
PLDIDE. Matheron, M.E. Young, J.; Matejka, J.C. St. Paul, Minn. : American Phytopathological Society. Plant disease. June 1988. v. 72 (6). p. 481-484. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1129

Phytophthora root and stem rot of apple rootstocks from stool beds.
PLDIDE. Tidball, C.J. Linderman, R.G. St. Paul, Minn. : American Phytopathological Society. Plant disease. Feb 1990. v. 74 (2). p. 141-146. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1130

Plant diseases.
WUEXA. Grove, G. Byther, R.; Covey, R. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Feb 1990. (1044,rev.). 4 p. ill. (NAL Call No.: DNAL 275.29 W27P).

1131

Population dynamics of Mucor piriformis in pear orchard soils as related to decaying pear fruit.
PHYTA. Dobson, R.L. Michailides, T.J.; Cervantes, L.A.; Spotts, R.A. St. Paul, Minn. : American Phytopathological Society. The population dynamics of Mucor piriformis in soil in four pear orchards were studied over a 3-yr period. Populations of sporangiospores fluctuated in an annual cyclic pattern, with a sharp increase occurring about 1-3 mo after harvest. Population densities increased from less than 10(2) to between 10(3) and 2 X 10(3) sporangiospores per cubic centimeter of dry soil, then rapidly declined between December and February, and usually remained below 10(2) sporangiospores per cubic centimeter throughout the summer. In soil kept free of vegetation and fruit, the population density of sporangiospores declined rapidly from 1.5 X 10(5) per cubic centimeter and remained below 10(3) per cubic centimeter for more than 2 yr. Addition of pea r fruits to this soil resulted in an increase from 14 to 9.6 X 10(3) spores per cubic centimeter between September 1986 and January 1987. In controlled plots, soils amended with pear fruit showed a significant increase in propagule population densities. However, in commercial orchards, the relationship between density of fruit on the orchard floor and population densities of sporangiospores in soil was less clear. The importance of additional factors affecting population densities of M. piriformis in pear orchards, including insect and rodent vectors, spread of infected fruits by mowing and birds, and favorable soil temperature, are discussed. Phytopathology. June 1989 v. 79 (6). p. 657-660. Includes references. (NAL Call No.: DNAL 464.8 P56).

1132

Populations of Mucor piriformis in soil of pear orchards in the Hood River Valley of Oregon.
PLDRA. Spotts, R.A. Cervantes, L.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1986. v. 70 (10). p. 935-937. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1133

Post infection evaluation of fungicides, 1985.
FNETD. Burr, T.J. Smith, C.A.; Seem, R.C.; Disbrow, L.D. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 10-11. (NAL Call No.: DNAL 464.9 AM31R).

1134

Postsymptom activity of ergosterol inhibitors against apple powdery mildew.
PLDRA. Cimanowski, J. Szkolnik, M. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1985. v. 69 (7). p. 562-563. Includes 12 references. (NAL Call No.: DNAL 1.9 P69P).

1135

Potential for biological control of Phytophthora root and crown rots of apple by Trichoderma and Gliocladium spp.
PHYTA. Smith, V.L. Wilcox, W.F.; Harman, G.E. St. Paul, Minn. : American Phytopathological Society. A system was developed to identify isolates of Trichoderma and Gliocladium with potential for biocontrol of P. cactorum. Seedlings from open-pollinated McIntosh apples were grown in potting mix infested with both Phytophthora cactorum and candidate biocontrol fungi (Trichoderma and Gliocladium spp.). After 14 days of growth and a 72-hr flooding interval, significant reductions in root damage and increases in plant weight, compared with seedlings exposed to P. cactorum alone, were observed with some isolates of biocontrol candidates. Presence of both the pathogen and biocontrol fungi in the potting mix significantly influenced plant weight and the incidence of hypocotyl infection, and chi-square analysis indicated a lack of independence between qualitative root damage ratings and the presence of biocontrol agents. In the absence of P. cactorum, growth of apple seedlings was significantly increased by the presence of some isolates of biocontrol fungi. The system developed will aid in the identification of isolates of Trichoderma and Gliocladium spp. with potential for biocontrol of P. cactorum. Phytopathology. Sept 1990. v. 80 (9). p. 880-885. Includes references. (NAL Call No.: DNAL 464.8 P56).

1136

Preparation of inoculum for brown rot of stone fruit and apple scab.
Szkolnik, M. St. Paul, Minn. : APS Press, c1986. Methods for evaluating pesticides for control of plant pathogens / edited by Kenneth D. Hickey ; prepared jointly by the American Phytopathological Society and the Society of Nematologists. p. 71-72. Includes references. (NAL Call No.: DNAL SB960.M47 1986).

1137

Processing quality of pear selections in the Harrow breeding program.
FVRJA. Kappel, F. Quamme, H.A. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1987. v. 41 (4). p. 136-140. Includes references. (NAL Call No.: DNAL 80 F9464).

1138

Protectant and after-infection activity of fungicides against Botryosphaeria obtusa on apple.
PLDIDE. Arauz, L.F. Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. Plant disease. Dec 1990. v. 74 (12). p. 1029-1034. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1139

Protective activity of fungicides and fungicide mixtures against apple scab, 1984.
FNETD. Szkolnik, M. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1985. v. 40. p. 25-26. (NAL Call No.: DNAL 464.9 AM31R).

1140

Purification and characterization of cutinase from Venturia inaequalis.
PHYTAJ. Koller, W. Parker, D.M. St. Paul, Minn. : American Phytopathological Society. Venturia inaequalis was grown in a culture medium containing purified apple cutin as the sole carbon source. After 8 wk of growth an esterase was isolated from the culture fluid and purified to apparent homogeneity. The enzyme hydrolyzed tritiated cutin and thus was identified as cutinase. The purified cutinase is a glycoprotein with a molecular mass of 21-23 kg/mol. as determined by various procedures. Remarkable structural features are a high content of glycine, a high content of nonpolar amino acids, two disulfide bridges, and a high degree of hydrophobicity. Cutin hydrolysis by cutinase from V. inaequalis is optimal at pH of 6 and thus different from the alkaline pH-optimum reported for other prurified cutinases. The hydrolysis of the model ester p-nitrophenyl butyrate was less affected by the pH. The esterase activity was strongly inhibited by diisopropyl fluorophosphate, and the phosphorylation of one serine was sufficient for complete inhibition. Thus, cutiinase from V inaequalis belongs to the class of serine hydrolases, a characteristic shared with other fungal cutinases. Phytopathology. Mar 1989. v. 79 (3). p. 278-283. Includes references. (NAL Call No.: DNAL 464.8 P56).

1141

Reduced sensitivity to sterol-inhibiting fungicides in field isolates of Venturia inaequalis.
PHYTA. Stanis, V.F. Jones, A.L. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Oct 1985. v. 75 (10). p. 1098-1101. Includes 23 references. (NAL Call No.: DNAL 464.8 P56).

1142

Reduction of spray applications by the use of the Reuter-Stokes apple scab predictor in Missouri, 1984.
FNETD. Shaffer, W.H. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 20. (NAL Call No.: DNAL 464.9 AM31R).

1143

Resistance to powdery mildew from some small-fruited Malus cultivars.
HJHSA. Gallott, J.C. Lamb, R.C.; Aldwinckle, H.S. Alexandria, Va. : American Society for Horticultural Science. HortScience. Dec 1985. v. 20 (6). p. 1085-1087. Includes references. (NAL Call No.: DNAL SB1.H6).

1144

A revision of Mill's criteria for predicting apple scab infection periods.
PHYTAJ. MacHardy, W.E. Gadoury, D.M. St. Paul, Minn. : American Phytopathological Society. A review of published investigations of the relationship between leaf wetness, temperature, and infection of apples leaves by Venturia inaequalis indicated that infection by ascospores requires approximately 3 hr less than the interval reported by Mills and Laplante (Cornell Ext. Bull. 711, rev. 1951). Conidia require approximately 2.5 hr more than ascospores to infect apple foliage, rather than two-thirds the time required by ascospores, as stated by Mills. The discrepancy with ascospore infection could be explained by the daily periodicity of ascospore discharge, in which nearly all ascospores are released during the daytime. A revision of Mill's warning system is proposed which computes primary infection periods from 0700 hr when the rain begins at night and utilizes a new polynomial equation for predicting infection. The impact of the revised criteria on scab warning systems is discussed. Phytopathology. Mar 1989. v. 79 (3). p. 304-310. Includes references. (NAL Call No.: DNAL 464.8 P56).

1145

'Richelieu' apple.
HJHSA. Granger, R.L. Fortin, C.N.; Rousselle, G.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1990. v. 25 (10). p. 1310-1311. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

1146

Role of cutinase in the penetration of apple leaves by Venturia inaequalis.
PHYTA. Koller, W. Parker, D.M.; Becker, C.M. St. Paul, Minn. : American Phytopathological Society. Cutin hydrolysate induced the production of extracellular cutinase by mycelium and germinating conidia of Venturia inaequalis. The level of production was dose-dependent up to 0.25 mg ml(-1) of hydrolysate added. Glucose was found to act as a repressor of cutinase production, but basal levels of the enzyme could be induced at high concentrations of glucose. Induction of cutinase was inhibited by cycloheximide, but not actinomycin D. O-Methyl-O-butyl-O-(3,5,6-trichloro-2-pyridyl)-phosphate was shown to act as an almost quantitative inhibitor of cutinase purified from V. inaequalis. In the presence of the inhibitor on the surface of apple leaves inoculated with conidia of the pathogen, the formation of subcuticular mycelium beneath appressoria, and thus, cuticle penetration, was prevented. The results suggest that cutinase is induced by cutin monomers liberated from cuticles upon contact with conidia, and that the enzyme is crucially involved in cuticle penetration. The induction of basal levels of cutinase in the presence of glucose indicates a leakiness of repression and might be related to a more permanent role of cutinase during subcuticular growth of the pathogen.
Phytopathology. Nov 1991. v. 81 (11). p. 1375-1379. Includes references. (NAL Call No.: DNAL 464.8 P56).

1147

Role of the cuticular membrane in ontogenic and Vf-resistance of apple leaves against Venturia inaequalis.
PHYTAJ. Valsangiacomo, C. Gessler, C. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Aug 1988. v. 78 (8). p. 1066-1069. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1148

Scab-immune apple varieties for new orchards.
Stebbins, R.L. Corvallis, Or. : The Service. Extension circular EC - Oregon State University, Extension Service. Apr 1990. (1334). 5 p. (NAL Call No.: DNAL 275.29 OR32C).

1149

Scab-resistant apple cultivars.
FVRJA. Korban, S.S. Morrisey, J.M. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1989. v. 43 (2). p. 48-50. (NAL Call No.: DNAL 80 F9464).

1150

Seasonal variation in extent of colonization of two apple rootstocks by five species of Phytophthora.
PLDRA. Jeffers, S.N. Aldwinckle, H.S. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1986. v. 70 (10). p. 941-945. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1151

Sensitivity distribution of Venturia inaequalis to the sterol demethylation inhibitor flusilazole: baseline sensitivity and implications for resistance monitoring.
PHYTA. Smith, F.D. Parker, D.M.; Koller, W. St. Paul, Minn. : American Phytopathological Society. Sensitivities (ED50 values) of 300 monoconidial isolates of Venturia inaequalis to the sterol demethylation inhibitor (DMI) flusilazole were determined, based on the inhibitory effect on mycelial growth. Isolates were collected from three different orchards: in orchards 1 and 2, DMIs had never been used, whereas various DMIs had been tested for 12 yr in orchard 3. ED50 values for individual isolates were lognormally distributed, ranging from 0.0006 to 0.17, 0.0016 to 0.14, and 0.0007 to 0.065 microgram ml-1 in orchards 1, 2, and 3, respectively. Population means of the log transformed ED50 values were 0.0068, 0.01, and 0.076 microgram ml-1 for orchards 1, 2, and 3, respectively. Although the mean sensitivities were similar for all three sites, the mean ED50 value of orchard 2, in which DMI fungicides had never been used, was significantly higher than the mean of the two other orchards. Furthermore, the population of orchard 3, which was exposed to DMI fungicides for 12 yr, had not become more resistant to flusilazole compared to unexposed populations. Thus, differences in mean sensitivities of V. inaequalis populations are not necessarily related to the history of use of DMIs. Regardless of small differences among orchards, the variance of sensitivities determined for the three populations was homogenous, and all ED50 values could be combined in one distribution. Sample sizes necessary to detect differences in mean population sensitivities were determined based on the variation among all 300 isolates. A sample size of 50 was sufficient to detect a difference of 1.6 times the mean ED50 value. Sample sizes of >50 did not greatly improve the precision of the test, whereas with sample sizes of < 15, the detectability of sensitivity differences among populations was decreased. The magnitude of growth inhibition at a single fungicide concentration close to the mean ED50 value of the baseline population was found to include a precise measure of flusilazole sensitivities.
Phytopathology. Apr 1991. v. 81 (4). p. 392-396. Includes references. (NAL Call No.: DNAL 464.8 P56).

1152

Separation by protein electrophoresis of six species of Phytophthora associated with deciduous fruit crops.
PHYTAJ. Bielenin, A. Jeffers, S.N.; Wilcox, W.F.; Jones, A.L. St. Paul, Minn. : American Phytopathological Society. Polyacrylamide gel electrophoresis was employed to compare the patterns of native and sodium dodecyl sulfate dissociated proteins obtained from mycelia of six species of Phytophthora isolated primarily from deciduous fruit crops grown in the Great Lakes states. The intraspecific variation in banding patterns among isolates identified as P. cactorum, P. cambivora, and P. syringae was less than that among isolates identified as P. megasperma, P. cryptogea, and P. drechsleri. When native proteins were analyzed, the number of distinct subgroups distinguished were two in P. drichsleri, three in P. crytogea, and six in P. megasperma. When dissociated proteins were analyzed, P. cactorum, P. syringae, and P. cambivora each formed single, distinct groups; P. cryptogea and P. drechsleri each formed two subgroups, one of which was common to isolates of both species. Most isolates of P. megasperma from deciduous fruit crops, when compared with isolates representing the six protein subgroups previously established for isolates of P. megasperma, had protein patterns belonging to the "broad host range" group, whereas the remaining few belonged to the "apple, cherry, apricot" group. The results obtained with electrophoresis support the use of this approach as an aid in distinguishing the species and subgroups within species of Phytophthora encountered on deciduous fruit crops. Phytopathology. Nov 1988. v. 78 (11). p. 1402-1408. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1153

Simultaneous use of infection criteria for three apple diseases for timing of fungicide sprays.
PHYTA. Arauz, L.F. Sutton, T.B.; Pope, L.R. St. Paul, Minn. : American Phytopathological Society. The feasibility of using criteria for infection by Botryosphaeria obtusa, Venturia inaequalis, and Gymnosporangium juniperi-virginianae on foliage of apple (Malus X domestica) in a combined weather-based forecasting system for frogeye leafspot, apple scab, and cedar-apple rust was evaluated through computer simulation and in a field study. Ten sets of historical weather data from two locations in North Carolina were analyzed. Using a 7-day minimum waiting period between eradicant sprays, eight to 15 fungicide applications per season were required. More applications were required with the forecaster than with a typical calendar-based spray program for five data sets; the same number of sprays were advised for one data set; and less spraying was advised with the forecaster for four data sets. With a 14-day minimum waiting period between fungicide applications, six to nine sprays per season were advised. In a field trial, weather-based eradicant sprays of penconazole or tebuconazole resulted in similar levels of frogeye leafspot and lower levels of scab and rust as compared to the levels resulting from the standard calendar-based protectant program (mancozeb + benomyl at 2-wk intervals). However, more sprays were required in the weather-based program using a 7-day minimum waiting period between eradicant sprays than for the calendar-based program. Levels of all three diseases were similar in a 14-day protectant program using either tebuconazole or penconazole as compared to eradicant programs of the same fungicides. Apple seedlings were set outdoors and exposed to natural inoculum of B. obtusa, G. juniperi-virginianae, and V. inaequalis for 18 individual wetting periods to evaluate the effect of eradicant sprays on subsequent disease development. In all cases in which infection occurred, application of an eradicant spray of tebuconazole resulted in reduction of the three diseases as compared to that on a nonsprayed control. Phytopathology. Nov 1990. v. 80 (11). p. 1212-1218. Includes references. (NAL Call No.: DNAL 464.8 P56).

1154

Soil-borne organisms affecting replanted pears.
HJHSA. Cameron, H.R. Westwood, M.N.; Lombard, P.B. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Interactions of Soil-borne Organisms and Woody Perennial Root Systems," July 31, 1985, Blacksburg, Virginia. Dec 1986. v. 21 (6). p. 1306-1310. Includes references. (NAL Call No.: DNAL SB1.H6).

1155

Spatial pattern, inoculum density-disease incidence relationship, and population dynamics of Sclerotium rolfsii on apple rootstock.
PLDRA. Tomasino, S.F. Conway, K.E. St. Paul, Minn. : American Phytopathological Society. Plant disease. Aug 1987. v. 71 (8). p. 719-724. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1156

Special apple disease problems and controls.
MUCBA. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Dec 1986. (E-154). p. 24-27. (NAL Call No.: DNAL 275.29 M58B).

1157

Stability of benomyl homologues and their efficacy against sensitive and benomyl-resistant Botrytis cinerea.
JAFCAU. Northover, J. Chiba, M. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Sept/Oct 1989. v. 37 (5). p. 1416-1421. Includes references. (NAL Call No.: DNAL 381 J8223).

1158

Strategies for selecting antagonistic microorganisms from the phylloplane.
Andrews, J.H. St. Paul, Minn. : American Phytopathological Society, c1985. Biological control on the phylloplane / edited by Carole E. Windels and Steven E. Lindow. Papers presented at a symposium entitled "Biological Control Strategies in the Phylloplane," Aug 15, 1984, Guelph, Ontario. p. 31-44. (NAL Call No.: DNAL SB732.6.B5).

1159

Suppression of apple bloom by fungicides that inhibit sterol synthesis.
PLDRA. Latham, A.J. Dozier, W.A. Jr.; Knowles, J.W.; Hollingsworth, M.H. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1985. v. 69 (9). p. 776-778. Includes 6 references. (NAL Call No.: DNAL 1.9 P69P).

1160

Survival of European red mite on apples with different levels of susceptibility to powdery mildew.
HJHSA. Goonewardene, H.F. Kwolek, W.F.; Williams, E.B. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1986. v. 21 (5). p. 1222-1224. Includes references. (NAL Call No.: DNAL SB1.H6).

1161

Temperature and wetness duration requirements for apple infection by Botryosphaeria obtusa.
PHYTA. Arauz, L.F. Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. The combined effect of temperature and wetness duration on infection of apple Botryosphaeria obtusa was studied on Delicious seedlings and Golden Delicious apple fruit. The optimum temperature for leaf infection was 26.6 C; at this temperature, 4.5 and 13 hr were required for the pathogen to cause light and severe infection, respectively. Lower temperatures required longer wetting periods for infection to occur, and no infection was observed at 8 C with wetness periods shorter than 48 hr. At 32 C, infection was reduced and a longer wetting period was required for infection than at 28 C. The optimum temperatures for fruit infection ranged from 20 to 24 C; 9 hr of wetting were required for light infection to occur. Infection of fruit required 38 hr of wetting at 8 C, whereas 28 and 32 C resulted in reduced fruit infection. Models were derived empirically to indicate the duration of leaf wetness (W) necessary, at a given temperature (T), for a specified level of infection to occur. For light leaf infection (less than 1 lesion/100(2) cm of leaf tissue), W = 3527.7T(-2), and for severe leaf infection (greater than 10 lesions/100 cm(2)), W = 116 - 5380.7T(-1) + 70257.5T(-2). For fruit infection, W = 14.8 - 265.2T(-1) + 2988.4T(2). No infection occurred under field conditions in those instances where no infection was predicted. The leaf infection models accurately predicted the level of 84.7% of the infections obtained under field conditions. In 8.5% of the cases, less disease than expected for the particular combination of W and T was obtained; more infection than predicted was observed in 6.8% of the cases. Most of the incorrect predictions occurred for wetting periods where moderate infection was anticipated.
Phytopathology. Apr 1989. v. 79 (4). p. 440-444. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1162

Use of fluid-drilling gels to deliver biological control agents to soil.
PLDRA. Conway, K.E. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1986. v. 70 (9). p. 835-839. Includes 24 references. (NAL Call No.: DNAL 1.9 P69P).

1163

Validation of an electronic unit for predicting apple scab infection periods.
OARCB. Ellis, M.A. Madden, L.V.; Wilson, L.L. Wooster, Ohio : The Center. Research circular - Ohio Agricultural Research and Development Center. July 1986. (290). p. 55-57. (NAL Call No.: DNAL 100 OH3R).

1164

Variation in ribosomal DNA among biological species of Armillaria, a genus of root-infecting fungi.
EVOLA. Anderson, J.B. Bailey, S.S.; Pukkila, P.J. Lawrence, Kan. : Society for the Study of Evolution. Evolution. Dec 1989. v. 43 (8). p. 1652-1662. ill. Includes references. (NAL Call No.: DNAL 443.8 EV62).

1165

1986 commercial apple spray guide.
Gorsuch, C.S. Miller, R.W. Clemson, S.C. : The Service. Information card - Clemson University. Cooperative Extension Service. Jan 1986. (110,rev.). 8 p. (NAL Call No.: DNAL 275.29 SO8I).

1166

1988 Illinois commercial tree fruit spray schedules / prepared by S.M. Ries ... et al. .
Ries, S. M. Urbana : Cooperative Extension Service, University of Illinois at Urbana-Champaign, 1988 . Abstract: This guide for commercial tree fruit growers includes 1988 Illinois tree fruit spray schedules and

pesticide recommendations for apple, peach, cherry, pear and plum crops. It provides information on fungicide, insecticide and muticide harvest restrictions, mouse and weed control, growth regulators, chemical thinning, pesticide handling, safety, and Integrated Pest Management (IPM). Cover title.~ "January, 1988"--P. 4 of cover.~ "C-1151 S.". 40 p. ; 28 cm. (NAL Call No.: DNAL SB608.F8N56).

1167

1989 commercial apple spray guide.
Miller, R.W. Gorsuch, C.S. Clemson, S.C. : The Service. Information card - Clemson University, Cooperative Extension Service. Jan 1989. (110,rev.). 12 p. (NAL Call No.: DNAL 275.29 S08I).

1168

Abnormalities in 'Starkspur Supreme Delicious' on nine rootstocks in the 1980-81 NC-140 cooperative planting.
FVRJA. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1991. v. 45 (4). p. 213-219. Includes references. (NAL Call No.: DNAL 80 F9464).

1169

The analysis of plasmid-mediated streptomycin resistance in Erwinia amylovora.
PHYTA. Chiou, C.S. Jones, A.L. St. Paul, Minn. : American Phytopathological Society. Streptomycin-resistant mutants of Erwinia amylovora were isolated from an apple orchard in Michigan and from crabapple trees adjacent to the same orchard in 1990. Isolates that grew on King's medium B amended with 100 microgram/ml of streptomycin sulfate were considered to be resistant strains, whereas isolates that failed to grow on this medium were considered to be sensitive strains. Growth of the resistant strains was not inhibited in a filter-paper disk assay (0.06-5 microgram of streptomycin sulfate), but growth of sensitive strains was inhibited at concentrations as low as 0.06 microgram of streptomycin sulfate. Only sensitive strains were detected in an additional 19 apple orchards sampled for resistant strains. In colony blot hybridizations, an internal portion of the streptomycin-resistance gene (probe SMP3) from strain Psp36 of Pseudomonas syringae pv. papulans hybridized with all streptomycin-resistant strains of E. amylovora, but not with streptomycin-sensitive strains. Probe SMP3 hybridized to a 2.7-kb restriction fragment from AvaI-digested total genomic and plasmid DNA of two resistant strains of E. amylovora and to a 1.5-kb fragment in DNA from strain Psp36 of P. s. papulans. The probe did not hybridize with digested DNA from sensitive strains. A 33-kb plasmid was present in all streptomycin-resistant field strains but not in streptomycin-sensitive strains. Streptomycin resistance was transferred by matings to four streptomycin-sensitive recipient strains of E. amylovora from each of two streptomycin-resistant donor strains. Transconjugants also contained the 33-kb plasmid. DNA from resistant strain Ea88-90 from Washington did not hybridize with the probe, indicating that this strain contains a resistance system unrelated to that in streptomycin-resistant strains from Michigan. Phytopathology. July 1991. v. 81 (7). p. 710-714. Includes references. (NAL Call No.: DNAL 464.8 P56).

1170

Annual deblossoming increases fire blight susceptibility of 'Golden Delicious'/M.9 apple trees.
FVRJA. Schupp, J.R. Ferree, D.C. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 40-44. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

1171

Apple decline.
PWHAA. Parish, C.L. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1989. (85th). p. 225-227. ill. Includes references. (NAL Call No.: DNAL 81 W273).

1172

Apple Decline Disease.
PWHAA. Parish, C.L. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1988. (84th). p. 108-112. ill. Includes references. (NAL Call No.: DNAL 81 W273).

1173

Association of an unusual strain of Xanthomonas campestris with apple.
PHYTAJ. Maas, J.L. Finney, M.M.; Civerolo, E.L.; Sasser, M. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Apr 1985. v. 75 (4). p. 438-445. ill. Includes 21 references. (NAL Call No.: DNAL 464.8 P56).

1174

Bactericidal treatment for the eradication of Erwinia amylovora from the surface of mature apple fruit.
PLDIDE. Janisiewicz, W.J. Zwet, T. van der. St. Paul, Minn. : American Phytopathological Society. Plant disease. Aug 1988. v. 72 (8). p. 715-718. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1175

Bud blast and canker of apple trees in Massachusetts.
NEMFA. Cooley, D.R. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1986. v. 92. p. 72-75. ill. (NAL Call No.: DNAL 81 M384).

1176

Chemical control of fire blight of apple during bloom, 1985.
FNETD. Norelli, J.L. Burr, T.J. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 4. (NAL Call No.: DNAL 464.9 AM3iR).

1177

Commercial apple insect and disease control--1991.
Von Broembsen, S. Coppock, S.; Taylor, G. Stillwater, Okla. : The Service. OSU current report - Oklahoma State University, Cooperative Extension Service. Feb 1991. (6241). 6 p. (NAL Call No.: DNAL S451.0508).

1178

Comparison of early performance and fire blight susceptibility of 12 early season apple cultivars.
FVRJA. Ferree, D.C. Funt, R.C.; Chandler, C.K. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1988. v. 42 (1). p. 24-28. Includes references. (NAL Call No.: DNAL 80 F9464).

1179

Compendium of apple and pear diseases /edited by A.L. Jones, H.S. Aldwinckle.
Aldwinckle, H. S.; Jones, A. L. St. Paul, Minn. : APS Press, c1990. vi, 100 p., 22 p. of plates : ill. (some col.) ; 28 cm. Includes bibliographical references and index. (NAL Call No.: DNAL SB608.A6C65).

1180

Controlling blister spot of crispin apples.
Burr, T.J. Wilcox, W.F. Batavia, N.Y. : Agricultural Div. of Coop Extension, Four Western Plain Counties, N.Y. State. Ag impact. May 1989. v. 16 (5). p. 7. (NAL Call No.: DNAL S544.3.N7A45).

1181

Controlling fire blight of pear and apple by accurate prediction of the blossom blight phase.
PLDIDE. Zwet, T. van der. Zoller, B.G.; Thompson, S.V. St. Paul, Minn. : American Phytopathological Society. Plant disease. June 1988. v. 72 (6). p. 464-472. ill. (NAL Call No.: DNAL 1.9 P69P).

1182

Crepuscular movement of Paraphlepsius irroratus (Say) (Hompoptera; Cicadellidae) between the groundcover and cherry trees.
EVETEX. Larsen, K.J. Whalon, M.E. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1987. v. 16 (5). p. 1103-1106. Includes references. (NAL Call No.: DNAL QL461.E532).

1183

Crown-gall injury in the orchard /by D.B. Swingle and H.E. Morris.
Swingle, Deane B. 1879-1944. Morris, H. E._1886-. Bozeman, Mont. : University of Montana, Agricultural Experiment Station, 1918. p. 121 -139 : ill. ; 23 cm. Includes bibliographical references. (NAL Call No.: DNAL 100 M76 (1) no.121).

1184

Differential susceptibility of Malus spp. cultivars Robusta 5, Novole, and Ottawa 523 to Erwinia amylovora.
PLDRA. Norelli, J.L. Aldwinkle, H.S.; Beer, S.V. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1986. v. 70 (11). p. 1017-1019. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1185

Dispersal of Paraphlepsius irroratus (Say) (Homoptera: Cicadellidae) in peach and cherry orchards.
EVETEX. Larsen, K.J. Whalon, M.E. Lanham, Md. : Entomological Society of America. Dispersal of the leafhopper vector of X-disease, Paraphlepsius irroratus (Say) within and into peach and cherry orchards was monitored by a mark, release, and recapture experiment. Field-collected adults were marked using fluorescent dyes and released at locations in and outside of two orchard sites. The marking method did not significantly affect leafhopper flight activity or survival. Dispersal was monitored using yellow sticky board traps for 21 d following each release, and the data were fitted to equations. The overall leafhopper recapture rate within 60 m was 2.35%. Dispersal rate for the first and second generations averaged 2.9 and 3.8 m/d. Wind was the major factor influencing leafhopper dispersal direction, as mean dispersal direction correlated significantly with mean wind direction (r = 0.94, P less than or equal to 0.05). Temperature affected leafhopper activity; this was particularly apparent with second-generation adults active at temperatures approximately 11 degrees C less than first-generation adults. There was no significant difference in the overall dispersal behavior between first and second-generations. Implications of this movement to the spread of X-disease are discussed. Environmental entomology. Oct 1988. v. 17 (5). p. 842-851. 111. Includes references. (NAL Call No.: DNAL QL461.E532).

1186

Effects of fosetyl-Al, metalaxyl, and Enterobacter aerogenes on crown and root rot of apple trees caused by Phytophthora cactorum in British Columbia.
PLDIDE. Utkhede, R.S. Smith, E.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1991. v. 75 (4). p. 406-409. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1187

'Elliot' pear.
HJHSA. Ryugo, K. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1989. v. 24 (5). p. 869-870. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

1188

Evaluating spray materials to control fire blight: laboratory, greenhouse, and field techniques.
Beer, S.V. Norelli, J.L. St. Paul, Minn. : APS Press, c1986. Methods for evaluating pesticides for control of plant pathogens / edited by Kenneth D. Hickey ; prepared jointly by the American Phytopathological Society and the Society of Nematologists. p. 134-142. Includes references. (NAL Call No.: DNAL SB960.M47 1986).

1189

Evaluation of mature apple fruit from Washington State for the presence of Erwinia amylovora.
PLDIDE. Roberts, R.G. Reymond, S.T.; McLaughlin, R.J. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1989. v. 73 (11). p. 917-921. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1190

Evaluation of streptomycin, oxytetracycline, and copper resistance of Erwinia amylovora isolated from pear orchards in Washington State.
PLDIDE. Loper, J. Henkels, M.D.; Roberts, R.G.; Grove, G.G.; Willet, M.J.; Smith, T.J. St. Paul, Minn. : American Phytopathological Society. Plant disease. Mar 1991. v. 75 (3). p. 287-290. maps. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1191

Evidence of biological control of Agrobacterium tumefaciens strains sensitive and resistant to agrocin 84 by different Agrobacterium radiobacter strains on stone fruit trees.
APMBA. Lopez, M.M. Gorris, M.T.; Salcedo, C.I.; Montojo, A.M.; Miro, M. Washington, D.C. : American Society for Microbiology. The effectiveness of Agrobacterium radiobacter K84, 0341, and a K84 non-agrocin-producing mutant (K84 Agr-) in biological control of crown gall on rootstocks of stone fruit trees was determined in three experiments. In experiment 1, K84 and 0341 controlled crown gall on plum plant in soil inoculated with two strains of Agrobacterium tumefaciens resistant to agrocin 84. In experiment 2, K84 controlled crown gall on peach plants in soils inoculated with strains of A. tumefaciens sensitive or resistant to agrocin 84 or with a mixture of both. However, the effectiveness of K84 was higher against the sensitive strain than against the resistant strain. There was a residual effect of K84 from one year to another in soil inoculated with the sensitive strains. In experiment 3, K84 and K84 Agr- controlled crown gall on plum and peach plants in soils inoculated with strains of A. tumefaciens sensitive or resistant to agrocin 84. The control afforded by K84 was higher than that provided by K84 Agr- against the sensitive strain but was similar against the resistant strain. Applied and environmental microbiology. Mar 1989. v. 55 (3). p. 741-746. Includes references. (NAL Call No.: DNAL 448.3 AP5).

1192

Field evaluations of frost injury to deciduous fruit trees as influenced by ice nucleation-active Pseudomonas syringae.
JOSHB. Proebsting, E.L. Jr. Gross, D.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. July 1988. v. 113 (4). p. 498-506. Includes references. (NAL Call No.: DNAL 81 S012).

1193

Fire blight and its control.
NEMFA. Steiner, P.W. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 39-43. (NAL Call No.: DNAL 81 M384).

1194

Fire blight of pear and apple /H.E. Thomas and K.G. Parker.
Thomas, H. Earl 1890-. Parker, K. G._1906-. Ithaca, N.Y. : Cornell University Agricultural Experiment Station, 1933. 24 p, 1 leaf of plates : ill. ; 23 cm. Bibliography: p. 22-24. (NAL Call No.: DNAL 100 N48C (1) no.557).

1195

Fire blight resistance of several wild pear seedlings collected in southwestern Ontario.
FVRJA. Quamme, H.A. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1986. v. 40 (2). p. 59-61. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

1196

Fire blight susceptibility of apple introductions and selections.
FVRJA. Mehlenbacher, S.A. Varney, E.H. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1987. v. 41 (1). p. 19-22. Includes references. (NAL Call No.: DNAL 80 F9464).

1197

Fireblight susceptibility of ornamental pears in southern conditions.
Fare, D.C. Gilliam, C.H.; Ponder, H.G. Auburn, Ala. : The Station. Research report series - Alabama Agricultural Experiment Station, Auburn University. Sept 1991. (7). p. 19-20. (NAL Call No.: DNAL S541.5.A2R47).

1198

Foliar antagonists: status and prospects.
Lindow, S.E. Orlando, Fla. : Academic Press, 1985. Biological control in agricultural IPM systems / edited by Marjorie A. Hoy, Donald C. Herzog. Paper presented at the "Symposium on Biological Control in Agricultural Integrated Pest Management Systems" June 4-6, 1984, held at the Citrus Research and Education Center, University of Florida, at. p. 395-413. Includes references. (NAL Call No.: DNAL SB933.3.B548).

1199

Frequency, distribution, and characteristics of endophytic Pseudomonas syringae in pear trees.
PHYTA. Whitesides, S.K. Spotts, R.A. St. Paul, Minn. : American Phytopathological Society. Internal stem and root tissues of pear trees were sampled for presence of Pseudomonas syringae at seven orchards in Dregon. Isolates positive for fluorescence (F+) and negative for cytochrome oxidase reaction (Dx-) were defined as P. syringae. Endophytic F+ Ox- strains occurred in 84% (57/68) of the trees. Eighty-one percent (191/235) of the F+ endophytic stains were Ox-. A total of 159 and 32 P. syringae strains were found in root and stem tissues, respectively. The endophytic P. syringae strains varied with respect to ice nucleation activity, induction of hypersensitive response on tobacco, pathogenicity on pear and cherry fruits, and genomic DNA fingerprinting. Inoculations of P. syringae into root and stem tissues of potted trees resulted in detectable but limited bacterial movement up to 3.0 cm in stems and no detectable movement above the crown from root inoculations. Phytopathology. Apr 1991. v. 81 (4). p. 453-457. Includes references. (NAL Call No.: DNAL 464.8 P56).

1200

Homologous streptomycin resistance gene present among diverse gram-negative bacteria in New York state apple orchards.
APMBA. Norelli, J.L. Burr, T.J.; Lo Cicero, A.M.; Gilbert, M.T.; Katz, B.H. Washington, D.C. : American Society for Microbiology. The streptomycin resistance gene of Pseudomonas syringae pv. papulans Psp36 was cloned into Escherichia coli and used to develop a 500-bp DNA probe that is specific for streptomycin resistance in P. syringae pv. papulans. The probe is a portion of a 1-kb region shared by three different DNA clones of the resistance gene. In Southern hybridizations, the probe hybridized only with DNA isolated from streptomycin-resistant strains of P. syringae pv. papulans and not with the DNA of streptomycin-sensitive strains. Transposon insertions within the region of DNA shared by the three clones resulted in loss of resistance to streptomycin. Colony hybridization of bacteria isolated from apple leaves and orchard soil indicated that 39% of 398 streptomycin-resistant bacteria contained DNA that hybridized to the probe. These included all strains of P. syringae pv. papulans and some other fluorescent pseudomonads and nonfluorescent gram-negative bacteria, but none of the gram-positive bacteria. The same-size restriction fragments hybridized to the probe in P. syringae pv. papulans. Restriction fragment length polymorphism of this region was occasionally observed in strains of other taxonomic groups of bacteria. In bacteria other than P. syringae pv. papulans, the streptomycin resistance probe hybridized to different-sized plasmids and no relationship between plasmid size and taxonomic group or between plasmid size and orchard type, soil association, or leaf association could be detected. Applied and environmental microbiology. Feb 1991. v. 57 (2). p. 486-491. ill. Includes references. (NAL Call No.: DNAL 448.3 AP5).

1201

Identification and detection of Erwinia amylovora with monoclonal antibodies.
PHYTAJ. Lin, C.P. Chen, T.A.; Wells, J.M.; Van der Zwet, T. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Feb 1987. v. 77 (2). p. 376-380. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1202

Identification of Erwinia amylovora, the fireblight pathogen, by colony hybridization with DNA from plasmid pEA29.
APMBA. Falkenstein, H. Bellemann, P.; Walter, S.; Zeller, W.; Geider, K. Washington, D.C. : American Society for Microbiology. All strains of Erwinia amylovora characterized carry a medium-size plasmid of 29 kilobases (pEA29). We mapped this plasmid with various restriction enzymes, cloned the whole DNA into an Escherichia coli plasmid, and subcloned restriction fragments. These DNA species were used for identification of E. amylovora after handling of strains in the laboratory and also in field isolates. About 70 strains of E. amylovora and 24 strains from nine other species, mainly found in plant habitats, were checked in a colony hybridization test. Virulent and avirulent E. amylovora strains reacted positively, whereas the other species were negative. Apart from the hybridization assay, the positive strains were additionally tested for ooze production on rich agar with 5% sucrose and on immature-pear slices. Unspecific background hybridization of non-E. amylovora strains found for hybridization with the whole E. amylovora plasmid was almost eliminated when a 5-kilobase SalI fragment from pEA29 was used as a probe and when the washes after the hybridization procedure were done with high stringency. Under these conditions, E. amylovora could be readily identified from field isolates. Applied and environmental microbiology. Nov 1988. v. 54 (ii). p. 2798-2802. ill. Includes references. (NAL Call No.: DNAL 448.3 AP5).

1203

Identification, symptomatology, and epidemiology of fire blight on Le Conte pear in the Nile Delta of Egypt.
PLDRA. Zwet, T. van der. St. Paul, Minn. : American Phytopathological Society. Plant disease. Mar 1986. v. 70 (3). p. 230-234. ill., maps. Includes 13 references. (NAL Call No.: DNAL i.9 P69P).

1204

Industry involvement a must!.
WEFGA. Klassen, P. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Apr 1987. v. 107 (4). p. 56F-56G. (NAL Call No.: DNAL 80 G85W).

1205

Infection of apple roots by actinomycetes associated with soils conducive to apple replant disease.
PLDRA. Westcott, S.W. III. Beer, S.V.; Stiles, W.C. St. Paul, Minn. : American Phytopathological Society. Plant disease. Dec 1986. v. 70 (12). p. 1125-1128. Includes references. (NAL Call No.: DNAL i.9 P69P).

1206

Inheritance of resistance to fire blight in Malus crosses.
Korban, S.S. Ries, S.M.; Morrisey, J.F.; Hattermann, D. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1988. v. 6 (1). p. 22-24. Includes references. (NAL Call No.: DNAL SB1.J66).

1207

Isolation and characterization of opine-utilizing strains of Agrobacterium tumefaciens and fluorescent strains of Pseudomonas spp. from rootstocks of Malus.
PHYTA. Canfield, M.L. Moore, L.W. St. Paul, Minn. : American Phytopathological Society. Media containing opines were used to isolate Agrobacterium tumefaciens and fluorescent Pseudomonas spp. from rootstock tumors and roots of Malus. Strain B49C of A. tumefaciens was used to inoculate cultivars Mark, EMLA 7, and Red Delicious seedling apple rootstocks in field trials at two nurseries in Washington state. Crown gall incidence was greater on inoculated than on uninoculated controls at both locations. Of 12 strains of A. tumefaciens isolated, three utilized mannopine, four utilized nopaline, and four utilized both mannopine and nopaline as the sole carbon and nitrogen source in culture media. None of the 12 strains utilized octopine, and one utilized none of the three opines tested. Forty-one strains of Pseudomonas spp. utilized octopine, 48 utilized nopaline, one utilized both octopine and nopaline, and none utilized mannopine. Seventy-seven of the isolates of Pseudomonas spp. inhibited the growth of A. tumefaciens in culture. Phytopathology. Apr 1991. v. 81 (4). p. 440-443. Includes references. (NAL Call No.: DNAL 464.8 P56).

1208

Multiple antibiotic production by Erwinia herbicola.
PHYTAJ. Ishimaru, C.A. Klos, E.J.; Brubaker, R.R. St. Paul, Minn. : American Phytopathological Society. Phytopathology. June 1988. v. 78 (6). p. 746-750. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1209

The new generation of disease resistant apples.
NEMFA. Lamb, R.C. Livermore, K.G. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 102-106. (NAL Call No.: DNAL 81 M384).

1210

Occurrence and nature of ice nucleation-active strains of Pseudomonas syringae on apple and peach trees in Georgia.
PLDIDE. Olive, J.W. McCarter, S.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1988. v. 72 (10). p. 837-843. maps. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1211

Overview of fire blight of pear.
PWHAA. Smith, T.J. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1986. (82nd). p. 163-171. (NAL Call No.: DNAL 81 W273).

1212

Pathogenicity and numerical analysis of phenotypic features of Pseudomonas syringae strains isolated from deciduous fruit trees.
PHYTAJ. Roos, I.M.M. Hattingh, M.J. St. Paul, Minn. : American Phytopathological Society. Phytopathology. June 1987. v. 77 (6). p. 900-908. Includes references. (NAL Call No.: DNAL 464.8 P56).

1213

Pear blight /J.C. Arthur.
Arthur, Joseph Charles, 1850-1942. Geneva, N.Y. : New York State Agricultural Experiment Station, 1885. 4 p. ; 23 cm. (NAL Call No.: DNAL 100 N48 (2) no.2).

1214

Pear production in Wisconsin.
Dana, M.N. Stang, E.J.; Mahr, D.L. Madison, Wis. : The Service. Publication - University of Wisconsin, Cooperative Extension Service. 1985. (A2072). 8 p. (NAL Call No.: DNAL S544.3.W6W53).

1215

Pear tree--'Elliot'.
Ryugo, K. Washington, D.C. : The Office. A new and distinct variety of pear tree primarily characterized by its tolerance to the fire-blight organism. (Erwinia amylovora), and further characterized by a blooming habit concurrent with 'Bartlett'; skin with firm and buttery texture, and fruit with a flavor which is excellent to good. The keeping quality of the fruit is good to excellent. Plant patent - United States Patent and Trademark Office. Dec 6, 1988. (6452). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

1216

Population dynamics and diversity of Pseudomonas syrinage on maple and pear trees and associated grasses.
PHYTAJ. Malvick, D.K. Moore, L.W. St. Paul, Minn. : American Phytopathological Society. The number of epiphytic Pseudomonas syringae isolated from maple twigs and leaves between July 1985 and September 1986 was erratic (undetectable to 10(5) cfu/g), whereas the number isolated from pear was more stable and often higher (10(3) to 10(6) cfu/g). P. syringae was isolated consistently (about 10(4)-10(7) cfu/g) from perennial rye, orchard, red fescue, annual rye, and brome grasses growing among trees in the maple nursery and from perennial rye grass in the pear orchard. In greenhouse pathogenicity tests, 87% of the P. syringae isolates from maple trees was pathogenic in maple seedlings, whereas 15% of the isolates from pear trees was pathogenic in young pear trees. Of the isolates tested from grasses, 55% from the maple nursery was pathogenic in maple seedlings, and 29% from grass in the pear orchard was pathogenic in young pear trees. These data indicate that grasses and trees support reservoirs of inoculum of pathogenic P. syringae. Indigenous isolates from a maple nursery were variable relative to pathogenicity and DNA restriction-fragment analysis, indicating that epiphytic populations of P. syringae from the grasses and trees were heterogenous. Phytopathology. Oct 1988. v. 78 (10). p. 1366-1370. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1217

Population of Erwinia amylovora on external and internal apple fruit tissues.
PLDIDE. Van der Zwet, T. Thomson, S.V.; Covey, R.P.; Bonn, W.G. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1990. v. 74 (9). p. 711-716. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1218

Regeneration and transformation experiments in apple.
NASSD. Welander, M. Maheswaran, G. New York, N.Y. : Plenum Press. NATO ASI series : Series A : Life sciences. In the series analytic: Woody plant biotechnology / edited by M.R. Ahuja. Proceedings of a Workshop at the Institute of Forest Genetics, USDA Forest Service, October 15-19, 1989, Placerville, California. 1991. v. 210. p. 237-246. ill. Includes references. (NAL Call No.: DNAL QH301.N32).

1219

Role of motility in apple blossom infection by Erwinia amylovora and studies of fire blight control with attractant and repellent compounds.
PHYTA. Bayot, R.G. Ries, S.M. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Apr 1986. v. 76 (4). p. 441-445. Includes 18 references. (NAL Call No.: DNAL 464.8 P56).

1220

The role of the stigma in fire blight infections.
PHYTAJ. Thomson, S.V. St. Paul, Minn. : American Phytopathological Society. Phytopathology. May 1986. v. 76 (5). p. 476-482. ill. Includes 25 references. (NAL Call No.: DNAL 464.8 P56).

1221

Scanning electron microscopy of apple blossoms colonized by Erwinia amylovora and E. herbicola.
PHYTAJ. Hattingh, M.J. Beer, S.V.; Lawson, E.W. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Sept 1986. v. 76 (9). p. 900-904. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1222

Scanning electron microscopy of invasion of apple leaves and blossoms by Pseudomonas syringae pv. syringae.
APMBA. Mansvelt, E.L. Hattingh, M.J. Washington, D.C. : American Society for Microbiology. Scanning electron microscopy indicated that Pseudomonas syringae pv. syringae L795 entered leaves through stomata and multiplied in the substomatal chambers. Strain L195 applied to blossoms colonized stigmas and also occurred in intercellular spaces of styles. Nonpathogenic strain L796 failed to colonize blossoms. This study suggests that inoculum of pathogenic P. syringae builds up apples leaves and blossoms. Applied and environmental microbiology. Feb 1989. v. 55 (2). p. 533-538. ill. Includes references. (NAL Call No.: DNAL 448.3 AP5).

1223

Screening shoot cultures of Malus for cedar-apple rust infection by in vitro inoculation.
PLDIDE. Joung, H. Korban, S.S.; Skirvin, R.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. Dec 1987. v. 71 (12). p. 1119-1122. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1224

The significance of secondary bloom to fire blight development on bartlett pears in eastern Washington.
PLDIDE. Covey, R.P. Fischer, W.R. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1988. v. 72 (10). p. 911. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1225

Special apple disease problems and controls.
MUCBA. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Dec 1986. (E-154). p. 24-27. (NAL Call No.: DNAL 275.29 M58B).

1226

Streptomycin resistance of Pseudomonas syringae pv. papulans in apple orchards and its association with a conjugative plasmid.
PHYTAJ. Burr, T.J. Norelli, J.L.; Katz, B.; Wilcox, W.F.; Hoying, S.A. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Apr 1988. v. 78 (4). p. 410-413. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1227

Susceptibility of pear cultivars to blossom blast caused by Pseudomonas syringae.
HJHSA. Whitesides, S.K. Spotts, R.A. Alexandria, Va. : American Society for Horticultural Science. Conditions were established for inducing pear (Pyrus communis L.) blossom blast caused by Pseudomonas syringae (Ps) on detached shoots. Highest incidence of infection followed occurrence of a major exotherm in the presence of Ps suspended in water drops on blossom tissue. Eight pear cultivars were evaluated for susceptibility to blossom blast, with the red-fruited 'Beurre d'Anjou' sports 'Gebhart' and 'Columbia' least susceptible and 'Doyenne du Comice', 'Beurre d'Anjou', and 'Beurre Bosc' most susceptible. HortScience. July 1991. v. 26 (7). p. 880-882. Includes references. (NAL Call No.: DNAL SB1.H6).

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Understanding fire blight--prediction and control.
ARHMA. Thomson, S.V. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1989. (119). p. 54-59. (NAL Call No.: DNAL 81 M58).

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Virulence of Erwinia amylovora strains to Malus sp. Novole plants grown in vitro and in the greenhouse.
PHYTAJ. Norelli, J.L. Aldwinckle, H.S.; Beer, S.V. St. Paul, Minn. : American Phytopathological Society. A rapid, efficient method to determine the virulence of strains of Erwinia amylovora to Malus sp. Novole has been developed and evaluated. The method uses plantlets of Novole propagated in vitro. Plantlets are inoculated by cutting one or more leaves with scissors dipped in a suspension of E. amylovora (5 x 10(7) colony-forming units per milliliter). Fourteen days later, those plantlets inoculated with strain E400 1A (virulent to Novole) showed typical fire blight symptoms including systemic necrosis and watersoaking; plantlets inoculated with strain Ea 273 (avirulent to Novole but virulent on most other apple cultivars) showed no systemic fire blight symptoms. When 39 strains of E. amylovora were evaluated for virulence to Novole, there was a significant association between data obtained from the plantlet assay and from inoculation of greenhouse-grown Novole plants. The plantlet assay was used to evaluate the virulence of 142 field strains from North America, Europe, and Egypt. Twelve strains from the eastern and central United States and Canada were virulent to Novole. Although there was a good correlation of symptom development in plantlets and greenhouse-grown plants inoculated with a standard virulent and avirulent strain, the growth of these E. amylovora strains after inoculation differed in the plant materials grown in vitro and in the greenhouse. In greenhouse-grown Novole plants, populations of both virulent and avirulent strains decreased 6 hr after inoculation. Between 6and 72 hr after inoculation the virulent strain increased by 10(2), whereas the avirulent strain increased very little. In in vitro plantlets, there was no decline in population after inoculation; instead cells of both virulent and avirulent strains increased by 10(4) and 10(2), respectively, between 0 and 96 hr after inoculation. Phytopathology. Oct 1988. v. 78 (10). p. 1292-1297. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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6-Thioguanine from Erwinia amylovora.
CUMIDD. Feistner, G. Staub, C.M. New York, N.Y. : Springer International. Current microbiology. 1986. v. 13 (2). p. 95-101. Includes 48 references. (NAL Call No.: DNAL QR1.C78).

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Apple tip leaf antigens that cause spurious reactions with tomato ringspot virus antisera in enzyme-linked immunosorbent assay.
PHYTAJ. Mink, G.I. Howell, W.E.; Frindlund, P.R. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Mar 1985. v. 75 (3). p. 325-329. Includes 18 references. (NAL Call No.: DNAL 464.8 P56).

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Control of dagger and lesion nematodes in apple and plum orchards with fenamiphos, carbofuran, and carbosulfan.
PLDIDE. Rosenberger, D.A. Meyer, F.W. St. Paul, Minn. : American Phytopathological Society. Plant disease. June 1988. v. 72 (6). p. 519-522. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Feeding behavior of the winter-form pear psylla, Psylla pyricola (Homoptera: Psyllidae), on reproductive and transitory host plants.
EVETEX. Ullman, D.E. McLean, D.L. College Park, Md. : Entomological Society of America. A comparison was made of the probing behavior of reproductively diapausing winter-form pear psylla, Psylla pyricola Foerster (Homoptera: Psyllidae), given access to leaves of Pyrus communis cv. Winter Nellis (pear, the sole reproductive host) and Prunus persica cv. Lovell (peach, a transitory host on which psylla do not reproduce). Winter-form pear psylla ingested predominantly from the phloem, xylem, and spongy parenchyma cells of pear and peach leaves. The elapsed time to first probe was significantly longer when insects were given access to peach than when given access to pear, yet the mean proportion of total probe time spent ingesting when various peach and pear leaf cell types were probed did not differ significantly, withthe exception of spongy parenchyma cells. These results suggest that preprobe stimuli mediate discrimination between reproductive and transitory host plants by winter-form psylla. The possible sensory mechanisms underlying host acceptance and discrimination between leaf cell types by winter-form pear psylla, as well as the epidemiological implications of these data for pear decline, are discussed. Environmental entomology. Aug 1988. v. 17 (4). p. 675-678. Includes references. (NAL Call No.: DNAL QL461.E532).

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Graft union histology and distribution of tomato ringspot virus in infected McIntosh/Malling Merton 106 apple trees.
PHYTAJ. Tuttle, M.A. Gotlieb, A.R. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Mar 1985. v. 75 (3). p. 347-351. ill. Includes 14 references. (NAL Call No.: DNAL 464.8 P56).

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Histology of Delicious/Malling Merton 106 trees affected by apple union necrosis and decline.
PHYTAJ. Tuttle, M.A. Gotlieb, A.R. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Mar 1985. v. 75 (3). p. 342-347. ill. Includes 18 references. (NAL Call No.: DNAL 464.8 P56).

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Homology of the agent associated with dapple apple disease to apple scar skin viroid and molecular detection of these viroids.
PHYTA. Hadidi, A. Huang, C.; Hammond, R.W.; Hashimoto, J. St. Paul, Minn. : American Phytopathological Society. Gel electrophoresis coupled with molecular hybridization analyses using 32P-labeled SP6-generated apple scar skin viroid (ASSV)-specific cRNA probes demonstrated that the pathogen associated with dapple apple disease is a viroid that is closely homologous to ASSV. Dapple apple viroid (DAV) consists of fewer than 359 nucleotides and is systemically distributed in apple seed, fruit, bark, leaf, and root tissues of infected apple trees. Molecular hybridization assays using 32P-labeled ASSV cRNA probes have been developed and applied for the detection of DAV or ASSV in small amounts of infected apple tissue (0.2-2.0 g). These assays are accurate, easy to perform, and applicable for screening DAV or ASSV in imported apple cultivars. These viroids now can be positively identified from infected apple tissue in a few days instead of a few years by fruit symptoms on grafted woody indicators. Phytopathology. Mar 1990. v. 80 (3). p. 263-268. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Influence of apple green crinkle disease on the quality of Granny Smith apples.
PLDRA. Fridlund, P.R. Drake, S.R. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1987. v. 71 (7). p. 585-587. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Influence of levels of leaf expression of apple mosaic on net photosynthesis and transpiration of leaves of four apple cultivars.
FVRJA. Ferree, D.C. Clayton-Greene, K. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1990. v. 44 (1). p. 45-47. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

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Phylogeny of capsid proteins of rod-shaped and filamentous RNA plant viruses: two families with distinct patterns of sequence and probably structure conservation.
VIRLA. Dolja, V.V. Boyko, V.P.; Agranovsky, A.A.; Koonin, E.V. Orlando, Fla. : Academic Press. Computer-assisted comparative analysis of all available amino acid sequences of the capsid proteins of positive strand RNA plant viruses with helical capsids is described. Two distinct families of homologous proteins were delineated through statistically significant sequence similarities, one including the capsid proteins of rod-shaped viruses (tobamo-, tobra-, hordei-, and furoviruses) and the other those of filamentous viruses (poty-, bymo-, potex-, carla-, and closteroviruses). It was concluded that the capsid proteins of all rod-shaped viruses, on the one hand, and filamentous viruses, on the other hand, evolved from common ancestors. Analysis of residue conservation patterns in the capsid proteins of rod-shaped viruses revealed maintenance of the hydrophobic core and of the (putative) salt bridge between conserved Arg and Asp residues. Sequence comparisons within the filamentous virus family expanded the observations on the relationship between the capsid proteins of potex-, carla-, poty-, and bymoviruses. Grouping of the beet yellows closterovirus capsid protein sequence, recently determined in this laboratory (Agranovsky et al., J. Gen. Virol., 1991, 72, 15-23), with those of potex- and carlaviruses was demonstrated. The coat protein of another closterovirus, apple chlorotic leaf spot virus, appeared to constitute a distinct phylogenetic lineage. Despite the lack of significant overall similarity, comparison of the alignments of the capsid proteins of the two families suggested formation of analogous salt bridges. Virology. Sept 1991. v. 184 (1). p. 79-86. Includes references. (NAL Call No.: DNAL 448.8 V81).

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Reactions of crab apples considered as potential apple pollinizers to latent virus infection.
FVRJA. Fridlund, P.R. Aichele, M.D. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1987. v. 41 (1). p. 17-18. Includes references. (NAL Call No.: DNAL 80 F9464).

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Manners, M.M. s.l. : The Society. Proceedings of the ... annual meeting of the Florida State Horticulture Society. 1986. v. 98. p. 344-347. ill. Includes references. (NAL Call No.: DNAL SB319.2.F6F56).

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Transmission of tomato ringsport virus by Xiphinema americanum and X. rivesi from New York apple orchards.
JONEB. Georgi, L.L. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Apr 1988. v. 20 (2). p. 304-308. Includes references. (NAL Call No.: DNAL QL391.N4J62).

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Virus tested pear germplasm available at the National Clonal Germplasm Repository in Corvallis, Oregon.
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FVRJA. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1991. v. 45 (4). p. 213-219. Includes references. (NAL Call No.: DNAL 80 F9464).

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Anticipated changes in postharvest technology for apples.
NEMFA. Blanpied, G.D. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held at the Sheraton Sturbridge Resort and Conference Center on January 30 and 31, 1991. 1991. (97th). p. 111-118. Includes references. (NAL Call No.: DNAL 81 M384).

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Apple replant disease; what is it, and how do you combat it?.
NEMFA. Costante, J.F. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 81-86. (NAL Call No.: DNAL 81 M384).

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Apple rosette /O.M. Morris.
Morris, O. M. 1874-1943. Pullman, Wash. : State College of Washington, Agricultural Experiment Station, 1923. Cover title. 30 p. : ill. ; 23 cm. Bibliography: p. 29. (NAL Call No.: DNAL 100 W27E no.177).

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Apple russeting.
PWHAA. Peterson, B. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 210-213. (NAL Call No.: DNAL 81 W273).

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Apple seedling response to calcium.
JPNUDS. Han, Z.H. Baligar, V.C.; Korcak, R.F.; Shen, T. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (9). p. 1155-1166. ill. Includes references. (NAL Call No.: DNAL QK867.J67).

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The association of molybdenum and oxalic acid with several mineral elements involved in the development of internal bark necrosis of the apple /by Donald Richard Heinicke.
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Bitter pit in apple fruit.
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CFRTA. Rom, R.C. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. 1986. v. 19. p. 183-188. Includes references. (NAL Call No.: DNAL 93.5 D96).

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PWHAA. Raese, T. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1988. (84th). p. 247-256. (NAL Call No.: DNAL 81 W273).

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NEMFA. Bramlage, W.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held on February 1-2, 1989, Sturbridge, Massachusetts. Feb 1989. v. 95. p. 113-119. (NAL Call No.: DNAL 81 M384).

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ARHMA. Bramlage, W.J. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1989. (119). p. 190-196. (NAL Call No.: DNAL 81 M58).

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A calmodulin and calcium-related physiological disorder (bitter pit) of apples.
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JPNUDS. Raese, J.T. Staiff, D.C. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. Paper presented at the "Fourth International Symposium on Iron Nutrition and Interactions in Plants," July 6-9, 1987, University of New Mexico, Albuquerque. June/Nov 1988. v. 11 (6/11). p. 1379-1385. Includes references. (NAL Call No.: DNAL QK867.J67).

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Compendium of apple and pear diseases /edited by A.L. Jones, H.S. Aldwinckle.
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PWHAA. Chen, P.M. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1989. (85th). p. 212-218. Includes references. (NAL Call No.: DNAL 81 W273).

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MUCBA. Dewey, D.H. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. May 1986. (1015). 2 p. (NAL Call No.: DNAL 275.29 M58B).

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Corking of 'Delicious' apples (Malus domestica Borkh.) on four rootstocks as affected by calcium and boron supplied through trickle irrigation.
JPNUDS. Smith, C.B. Morrow, C.T.; Greene, G.M. II. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. Paper presented at the "Tenth International Plant Nutrition Colloquium", August 4-9, 1986, Beltsville, Maryland. 1987. v. 10 (9/16). p. 1917-1924. Includes references. (NAL Call No.: DNAL QK867.J67).

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Cysteine as an inhibitor of enzymatic browning. 1. Isolation and characterization of addition compounds formed during oxidation of phenolics by apple polyphenol oxidase.
JAFCAU. Richard, F.C. Goupy, P.M.; Nicolas, J.J.; Lacombe, J.M.; Pavia, A.A. Washington, D.C. : American Chemical Society. The oxidation of different phenols 4-methylcatechol (MC), chlorogenic acid (CG), (-)-epicatechin (EC), and (+)-catechin CA) , catalyzed by apple polyphenol oxidase (PPO), was investigated in the presence of an excess of cysteine. The occurrence of one cysteine addition compound with the two former phenols and two cysteine addition products with the latter phenols was demonstrated by HPLC. In all cases, the formation of addition compound(s) was proportional to the degradation of the phenol. After purification by gel filtration on Trisacryl GF05, the structure of each cysteine conjugate was determined by 1H NMR spectroscopy. After additional 1H homonuclear decoupling and 2D homonuclear COSY experiments, it was shown unequivocally that adduct with MC was 5-S-cysteinyl-3,4-dihydroxytoluene. With CG, the structure was 2-S-cysteinylchlorogenic acid. With catechins, the cysteine was attached on the B ring for the two conjugates. The 2'-position was involved in the first addition compound, whereas it was the 5'-position in the second one. Moreover, the study of UV spectra of the purified compounds allowed the conclusion that the two conjugates of each

catechin were formed at the same rate in equivalent amounts. Journal of agricultural and food chemistry. May 1991. v. 39 (5). p. 841-847. Includes references. (NAL Call No.: DNAL 381 J8223).

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Effect of early season foliar sprays of GA4+7 on russeting and return bloom of 'Golden Delicious' apple.
HJHSA. Meador, D.B. Taylor, B.H. Alexandria, Va. : American Society for Horticultural Science. HortScience. June 1987. v. 22 (3). p. 412-415. Includes references. (NAL Call No.: DNAL SB1.H6).

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Effect of Fe level and solution culture pH on severity of chlorosis and elemental content of apple seedlings.
JPNUDS. Ji, Z.H. Korcak, R.F.; Faust, M. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1985. v. 8 (4). p. 345-355. ill. Includes 18 references. (NAL Call No.: DNAL QK867.J67).

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Effect of seasonal soil waterlogging on vegetative growth and fruiting of apple trees.
JOSHB. Olien, W.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Mar 1987. v. 112 (3). p. 209-214. ill. Includes references. (NAL Call No.: DNAL 81 S012).

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Efficacy of diphenylamine, ultra-low oxygen, and ethylene scrubbing on scald control in 'Delicious' apples.
JOSHB. Lau, O.L. Alexandria, Va. : The Society. Incidence of scald in nontreated and DPA (2000 mg.liter-1)-treated 'Delicious' apples (Malus domestica Borkh.) was assessed after 8.5 months in 1.5% or 0.7% O2 plus 1.5% CO2 at 0.2C, with and without C2H4 scrubbing. Incidence of scald was high in non-DPA fruit held in 1.5% O2, and DPA treatment reduced scald in fruit held in 1.5% or 0.7% O2. Scald control was better with 0.7% O2 and no DPA treatment than with 1.5% O2 and a DPA dip. Ethylene scrubbing had no effect on scald in fruit held in 0.7% or 1.5% O2. Susceptibility of fruit to scald and flesh browning exhibited seasonal variation, which was related to the differences in fruit maturity and the amount of watercore at harvest, respectively. Journal of the American Society for Horticultural Science. Nov 1990. v. 115 (6). p. 959-961. Includes references. (NAL Call No.: DNAL 81 S012).

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Improved performance of bearing 'Delicious' apple trees with nitrogen and phosphate fertilization in a low-phosphorus soil.
JOSHB. Raese, J.T. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Sept 1986. v. 111 (5). p. 665-669. Includes references. (NAL Call No.: DNAL 81 S012).

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Increasing the calcium content of apple fruits to improve storability and attenuate physiological disorders.
ARHMA. Dilley, D.R. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 195-207. Includes references. (NAL Call No.: DNAL 81 M58).

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The influence of calcium on senescence changes and physiological disorders in apples.
NEMFA. Bramlage, W.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 80-85. (NAL Call No.: DNAL 81 M384).

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OARCB. Ferree, D.C. Ellis, M.A. Wooster, Ohio : The Center. Research circular - Ohio Agricultural Research and Development Center. July 1986. (290). p. 14-16. Includes references. (NAL Call No.: DNAL 100 OH3R).

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OARCB. Ferree, D.C. Schmid, J.C. Wooster, Ohio : The Center. Research circular - Ohio Agricultural Research and Development Center. July 1986. (290). p. 9-13. Includes references. (NAL Call No.: DNAL 100 OH3R).

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WEFGA. Tvergyak, P.J. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. May 1988. v. 108 (5). p. 20-21. ill. (NAL Call No.: DNAL 80 G85W).

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Metabolic changes in iron-deficient apple seedlings.
JPNUDS. Sun, X.P. Wang, S.Y.; Tong, Y.A.; Korcak, R.F.; Faust, M. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. Paper presented at the "Tenth International Plant Nutrition Colloquium," August 4-9, 1986, Beltsville, Maryland. 1987. v. 10 (9116). p. 1021-1030. ill. Includes references. (NAL Call No.: DNAL QK867.J67).

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Mineral analysis from corkspotted and normal 'Anjou' pear fruit.
JOSHB. Curtis, D. Righetti, T.L.; Mielke, E.; Facteau, T. Alexandria, Va. : The Society. Relationships between mineral content and corkspot in 'Anjou' pears (Pyrus communis) were evaluated in 1985 and 1986. Although there were no significant relationships between mean preharvest fruit mineral content and corkspot incidence, the postharvest mineral concentrations of corkspotted and normal fruit were markedly different. Corkspotted and normal pear fruit had different and N : Ca ratios in all types of subsample peels, opposing tangential slices with pe , opposing tangential slices without peels, cortical tissue plugs from the area next to the core, cortical tissue plugs from the area just inside of the peel, and the cores including seed), based on either dry or fresh weight. The dry-weight basis also revealed differences in Mg concentrations in both years and in B and K concentrations in 1986. Peel concentrations correlated with other tissues and were the easiest subsample to process. Corkspot was absent in either year, with a peel N : Ca ratio below 6.3. A computer model used mean Ca concentrations and standard deviations to estimate the percentage of pears in each orchard that were less than a given threshold level. When the overall average percentage of arbitrarily defined low-Ca pears was small (< 10%), it was difficult to predict the actual number of low-Ca pears from mean Ca concentrations. Therefore, it may not be realistic to expect strong correlations between mean Ca concentration and the incidence of disorders commonly encountered in Hood River, Ore. This situation occurred even when Ca concentrations of disordered and normal pears clearly differed. Journal of the American Society for Horticultural Science. Nov 1990. v. 115 (6). p. 969-974. ill. Includes references. (NAL Call No.: DNAL 81 SO12).

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Nondestructive detection of core breakdown in 'Bartlett' pears with nuclear magnetic resonance imaging.
HJHSA. Wang, C.Y. Wang, P.C. Alexandria, Va. : American Society for Horticultural Science. HortScience. Feb 1989. v. 24 (1). p. 106-109. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

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Observations on the relationships among seed number, fruit calcium, and senescent breakdown in apples.
HJHSA. Bramlage, W.J. Weis, S.A.; Greene, D.W. Alexandria, Va. : American Society for Horticultural Science. HortScience. Mar 1990. v. 25 (3). p. 351-353. Includes references. (NAL Call No.: DNAL SB1.H6).

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PWHAA. Evans, R. Peterson, B.; Graves, B. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 203-216. (NAL Call No.: DNAL 81 W273).

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Permeability characteristics of isolated Golden Delicious' apple fruit cuticles with regard to calcium.
JOSHB. Chamel, A.R. Alexandria, Va. : The Society. The penetration of Ca through apple (Malus domestica Borkh) fruit cuticles was investigated using isolated cuticles. Permeability coefficients (P) and diffusion coefficients (D) were determined from self-diffusion measurements (0.1 mM CaC12) in permeability apparatus. It was demonstrated that the apple fruit cuticles carry fixed charges with an isoelectric point of 2.1 and that Ca can penetrate into fruit directly across the fruit cuticle. Intraspecific variably was high, which is typical of cuticular permeability (P = 1.852 x 10(-6) cm.s-1, SD = 1.29; D = 13.830 x 10(-11) cm2.s-1, SD = 7.72, at pH 8). The permeability coefficient increased with increasing pH; this result was confirmed with isolated tomato fruit cuticles that revaled a lower permeability (P = 0.253 x 10(-6) cm.s -1; SD =0.12; D = 3.502 x 10(-11) cm 2.s-1, SD = 1.12, at pH 8). The permeability increased to a value about four times greater after the extraction of soluble cuticular lipids. There appears to be a direct relationship between cuticular sorption and penetration. Journal of the American Society for Horticultural Science. Sept 1989. v. 114 (5). p. 804-809. ill. Includes references. (NAL Call No.: DNAL 81 SO12).

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Raese, J.T. Portland, Or. : Timber Press. Horticultural reviews. Literature review. 1989. v. 11. p. 357-411. ill. Includes references. (NAL Call No.: DNAL SB317.5.H6).

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Physiology and control of superficial scald of apples: a review.
HJHSA. Ingle, M. D'Souza, M.C. Alexandria, Va. : American Society for Horticultural Science. HortScience. Literature review. Feb 1989. v. 24 (1). p. 28-31. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

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MUCBA. Jones, A.L. Burton, C.L. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Dec 1986. (E-154). p. 78-79. (NAL Call No.: DNAL 275.29 M58B).

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Preharvest ethephon sprays reduce superficial scald of 'Granny Smith' apples.
HJHSA. Lurie, S. Meir, S.; Arie, R.B. Alexandria, Va. : American Society for Horticultural Science. HortScience. Feb 1989. v. 24 (1). p. 104-106. Includes references. (NAL Call No.: DNAL SB1.H6).

1287

Reduction of bitter pit of apples with phorone.
HJHSA. Scott, K.J. Wills, R.B.H.; Yuen, C.M.C. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1986. v. 21 (2). p. 268-270. Includes references. (NAL Call No.: DNAL SB1.H6).

1288

Senescent breakdown of 'Jonathan' apples in relation to the water-soluble calcium content of the fruit pulp before and after storage.
JOSHB. Saks, Y. Sonego, L.; Ben-Arie, R. Alexandria, Va. : The Society. In 'Jonathan' apples grown in Israel, the incidence of senescent breakdown after 5 months of storage at OC was not correlated with total or water-soluble Ca content at harvest. Likewise, no other assayed component of the water-soluble or total mineral content (P, Mg, K) of the fruit pulp at harvest correlated with the disorder after storage. After storage, a general decrease in the solubility of Ca was observed. However, this decrease was not uniform in all fruit and, as a result, the correlation between water-soluble and total Ca content, which was high at harvest, diminished after storage. Water-extractable Ca from stored fruit was negatively correlated and water-soluble K/Ca was positively correlated with the incidence of senescent breakdown, whereas total Ca was not correlated. Journal of the American Society for Horticultural Science. July 1990. v. 115 (4). p. 615-618. Includes references. (NAL Call No.: DNAL 81 SO12).

1289

Sorbitol metabolism, the climacteric, and watercore in apples.
JOSHB. Marlow, G.C. Loescher, W.H. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Sept 1985. v. 110 (5). p. 676-680. Includes references. (NAL Call No.: DNAL 81 SO12).

1290

Studies of the nature and control of york spot, a physiological disorder of the York Imperial apple / by Donald Bruce Williams. -.
Williams, Donald Bruce, 1934-. 1962. Thesis (Ph.D.)--Pennsylvania State University, 1962. Photocopy. Ann Arbor, Mich. : University Microfilms International, 1979. (viii), 178 leaves ; 20 cm. Bibliography: leaves (155)-161. (NAL Call No.: DISS 63-3,099).

1291

Time of application of calcium sprays to increase fruit calcium and reduce fruit pitting of apples sprayed with TIBA.
HJHSA. Stahly, E.A. Alexandria, Va. : American Society for Horticultural Science. HortScience. Feb 1986. v. 21 (1,section 1). p. 95-96. Includes references. (NAL Call No.: DNAL SB1.H6).

1292

Trunk injection of iron compounds as a treatment for overcoming iron chlorosis in apple trees.
HJHSA. Barney, D.L. Walser, R.H.; Davis, T.D.; Williams, C.F. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1985. v. 20 (2). p. 236-238. Includes 16 references. (NAL Call No.: DNAL SB1.H6).

1293

Understanding watercore.
Loescher, W. Kupferman, E. Pullman, Wash. : Washington State University Cooperative Extension. Postharvest pomology newsletter. Nov 1985. v. 3 (4). p. 3-13. Includes references. (NAL Call No.: DNAL TP440.P67).

1294

Apple thinning by photosynthetic inhibition.
JOSHB. Byers, R.E. Barden, J.A.; Polomski, R.F.; Young, R.W.; Carbaugh, D.H. Alexandria, Va. : The Society. Shading (92%) of 'Redchief Delicious' apple (Malus domestica Borkh.) trees for 10-day periods from 10 to 20, 15 to 25, 20 to 30, and 25 to 35 days after full bloom (DAFB) caused greater fruit abscission than shading from 5 to 15, 30 to 40, 35 to 45, or 47 to 57 DAFB. Fruit 8 to 33 mm in diameter (10 to 30 DAFB) were very sensitive to 10 days of shade, even though fruit sizes of 6 to 12 mm are considered the most sensitive to chemical thinners. In a second test, shading for 3 days caused fruit thinning; 5 days of shade in the periods 18 to 23, 23 to 28, and 28 to 33 DAFB caused greater thinning than 11 to 16 or 33 to 38 DAFB. Shading reduced photosynthesis (Pn) to about one-third that of noncovered trees. Terbacil (50 mg(liter-1) + X-77 surfactant (1250 mg.liter-1) applied with a handpump sprayer 5, 10, or 15 DAFB greatly reduced fruit set and caused some leaf yellowing, particularly in the earliest treatments. Terbacil reduced Pn by more than 90% at 72 hours after application. Shoot growth of trees defruited by shade or terbacil was equivalent to defruited or deblossomed trees; ethephon (1500 mg(liter-1) inhibited tree growth and defruited trees. No terbacil residues were dectected in fruit at harvest from applications made 5, 15, 20, 25, or 30 DAFB. Eleven of 12 photosynthesis-inhibiting herbicides were also found to thin 'Redchief Delicious' apple trees. Shading caused more thinning than terbacil at the later applications, which may reflect poorer absorption and/or lesser photosynthetic inhibition than when terbacil was applied to older leaves. Journal of the American Society for Horticultural Science. Jan 1990. v. 115 (1). p. 14-19. Includes references. (NAL Call No.: DNAL 81 SO12).

1295

An artificial apple bud for frost temperature sensing.
TAAEA. Heinemann, P.H. Morrow, C.T. St. Joseph, Mich. : The Society. Transactions of the ASAE - American Society of Agricultural Engineers. Sept/Oct 1986. v. 29 (5). p. 1338-1341. ill. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1296

Differential tolerance of woody nursery crop seedlings to napropamide.
WETEE9. Crabtree, S. Crabtree, G. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct/Dec 1989. v. 3 (4). p. 584-589. ill. Includes references. (NAL Call No.: DNAL SB610.W39).

1297

Don't let granny get a sunburn.
WEFGA. Stockwin, W. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Jan 1988. v. 108 (1). p. 24F-24G. ill. (NAL Call No.: DNAL 80 G85W).

1298

Effect of chlorpyrifos 50W on fruit finish and packout of 'Golden Delicious'.
Hogmire, H.W. Crim, V.L.; Annan, R.O. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. July 1988. v. 5 (3). p. 209-214. Includes references. (NAL Call No.: DNAL SB599.J69).

1299

Effect of HOE 39866 during growing season on apple tree growth.
PNWSB. Young, R.S. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1986. v. 40. p. 199-202. Includes references. (NAL Call No.: DNAL 79.9 N814).

1300

Evaluation of four soil amendments in ameliorating toxic conditions in three orchard subsoils.
AAREEZ. Baugher, T.A. Singh, R.N. New York, N.Y. : Springer. Rock phosphate was compared to agricultural limestone, superphosphate, and lime plus superphosphate for controlling Al and Mn toxicities in orchard soils. Acid soils were selected from orchards where fruit tree growth was unfavorable, and "Delicious" apple (Malus domestica Borkh.) trees were planted in both pot cultures and field plots. Rock phosphate was effectively acidulated in Hagerstown silt loam (pH 5.0-5.5), Berks channery silt loam (pH 3.5-4.0), and Lehew channery fine sandy loam (pH 4.0-4.5). Soil pH was increased, soil and plant levels of Ca, Mg and P were increased and soil and plant levels of Al and Mn were decreased to nontoxic levels. Root and shoot growth were enhanced, and the incidence and severity of internal bark necrosis (IBN) were decreased. Rock phosphate was less effective than lime or lime plus phosphate in increasing pH and decreasing Mn and Al. Exchangeable Al and available Mn in rock phosphate-treated soils were well below the toxic range, however, and levels of essential nutrients were optimal. Eight years following field application of amendments, rock phosphate continued to affect soil Ca and P levels, and some lime plus phosphate treatments persisted in affecting soil pH and soil Mn. Lime or phosphate alone were not persistent. Applied agricultural research. Spring 1989. v. 4 (2). p. 111-117. Includes references. (NAL Call No.: DNAL S539.5.A77).

1301

Fine structure of apple leaves treated with the sterol-inhibiting fungicide bitertanol.
HJHSA. Overton, S.V. Moore, L.D.; Miller, O.K. Alexandria, Va. : American Society for Horticultural Science. Ultrastructural observations were made of leaves of apple (Malus domestica Borkh. cv. Red Delicious) 12, 24, and 72 hours following a single foliar application of the sterol-inhibiting fungicide bitertanol. Thylakoids of chloroplasts from treated leaves were swollen and irregular and chloroplasts had lost their integrity within 12 hours after treatment. Occasionally, mitochondria looked washed out, although no other changes in membrane or organelle structures were observed. Within 24 to 72 hours, moreover, thylakoids of chloroplasts from treated leaves returned to a state similar to that of the controls. However, the numbers of starch granules in the chloroplasts of treated leaves appeared to increase throughout the 72 hours and remained somewhat higher than levels in controls. Thus, bitertanol does not appear to have a lasting effect on apple leaves. HortScience. Feb 1991. v. 26 (2). p. 173-175. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

1302

FROSTPRO, a model of overhead irrigation rates for frost/freeze protection of apple orchards.
HJHSA. Perry, K.B. Alexandria, Va. : American Society for Horticultural Science. HortScience. Aug 1986. v. 21 (4). p. 1060-1061. Includes references. (NAL Call No.: DNAL SB1.H6).

1303

Glyphosate applications to the bark of nine tree species.
PNWSB. Kuhns, L.J. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6-9, 1992, Boston, Massachusetts. 1992. v. 46. p. 23-26. (NAL Call No.: DNAL 79.9 N814).

1304

Management of European red mite (Acari: Tetranychidae) and several aphid species on apple with petroleum oils and an insecticidal soap.
JEENAI. Lawson, D.S. Weires, R.W. Lanham, Md. : Entomological Society of America. Three petroleum oils and one insecticidal soap were evaluated in laboratory tests at different rates for ovicidal efficacy against overwintering Panonychus ulmi (Koch) eggs. Sunspray 6E and Volck Supreme oils caused the greatest mortality of all materials tested. Sunspray 6E+ caused less mortality than did the Sunspray 6E and Volck Supreme but greater mortality than Safer Insecticidal Soap Concentrate, which caused only slightly greater mortality than the distilled water check. Field applications of the same materials by airblast sprayer and high-pressure handgun caused less mortality of overwintering eggs than in the laboratory study. Summer applications of these materials were tested for their ability to suppress mite and aphid populations throughout the growing season. Applications of all materials provided significant control of populations of P. ulmi, rosy apple aphid, Dysaphis plantaginea (Passerini), and a green aphid complex made up of the apple aphid, Aphis pomi De Geer, and the spirea aphid, Aphis spiraecola Patch. Spray volume, coverage, and rate of material applied were related to mite and insect control and plant phytotoxicity; the greater the volume, coverage, and rates used, the greater the control and phytotoxicity obtained. Volck Supreme oil, particularly at the high rate, caused more damage to fruit and foliage than did any of the other treatments. Sunspray 6E and Sunspray 6E+ appear to be equally safe to fruit and foliage based on phytotoxicity ratings taken throughout the growing season. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1550-1557. Includes references. (NAL Call No.: DNAL 421 J822).

1305

Mechanical harvestability of Y-shaped and pyramid-shaped 'Empire' and 'Delicious' apple trees.
JOSHB. Robinson, T.L. Millier, W.F.; Throop, J.A.; Carpenter, S.G.; Lakso, A.N. Alexandria, Va. : The Society. Mature 'Empire' and 'Redchief Delicious' apple trees (Malus domestica Borkh.) trained to a Y-shaped trellis (Y/M.26) or trained as pyramid-shaped central leaders (CL/M.7) were mechanically harvested with the Cornell trunk recoil-impact shaker during 4 years. With 'Empire', fruit removal from the Y/M.26 trees (85% to 90%) was significantly less than from the CL/M.7 trees (95% to 97%). With 'Delicious' there were no differences in fruit removal (90% to 95%) between the two tree forms in any year. When the catching pad was on the ground, fruit grade based on damage was only slightly better for the Y/M.26 trees than for the CL/M.7 trees. When the catching pad was raised up near the Y/M.26 canopy, fruit grade was significantly improved for the Y/M.26 trees and was better than the CL/M.7 trees. Fruit grade for both cultivars ranged from 83% to 94% Extra Fancy with 5% to 16% culls for the Y/M.26 trees and from 74% to 88% Extra Fancy and 11% to 21% culls for the CL/M.7 trees. Skin punctures, skin breaks, and number of large and small bruises were lower and the percentage of nondamaged fruit was higher with the Y/M.26 trees when the pads were close to the canopy than when the pads were on the ground. The CL/M.7 trees had higher levels of all types of fruit damage than did the Y/M.26 trees. Damaged fruit from the CL/M.7 trees was mainly from the top half of the tree, while fruit from lower-tier scaffold branches had low levels of damage. Mechanically harvested fruit from the Y/M.26 trees had lower incidences of fruit rot and flesh breakdown after a 6-month storage period than did fruit from the CL/M.7 trees.

Stem pulling was high with both systems and averaged 60% for 'Delicious' and 30% for 'Empire'. The advantage of the single plane Y-trellis system for mechanical harvesting appears to be that the catching pads can be placed close to the fruit, thereby reducing fruit damage. Journal of the American Society for Horticultural Science. May 1990. v. 115 (3). p. 368-374. Includes references. (NAL Call No.: DNAL 81 SO12).

1306

Minimize problems with practical approaches.
WEFGA. Cowie, V. Willoughby, Ohio : Meister Pub. Co. Western fruit grower. Feb 1986. v. 106 (2). p. 49-51. (NAL Call No.: DNAL 80 G85W).

1307

Occurrence and nature of ice nucleation-active strains of Pseudomonas syringae on apple and peach trees in Georgia.
PLDIDE. Olive, J.W. McCarter, S.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1988. v. 72 (10). p. 837-843. maps. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1308

An overview of replant problems.
PWHAA. Stevens, R.G. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 132-142. (NAL Call No.: DNAL 81 W273).

1309

Panel--frost control survey results.
PWHAA. Evans, R. Peterson, B.; Graves, B. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 203-216. (NAL Call No.: DNAL 81 W273).

1310

Phosphate-fertilizer-induced salt toxicity of newly planted apple trees.
SSSJD4. Peryea, F.J. Madison, Wis. : The Society. Monoammonium phosphate (MAP) or triple superphosphate (TSP) added to planting holes often stimulates early growth of apple trees (Malus domestica Borkh.); however, high rates may stunt or kill trees. A greenhouse study was conducted on a Quincy sand (a mixed, mesic Xeric Torripsamment) and a Cowiche silt loam (a fine-loamy, mixed, mesic Aridic Argixeroll) to examine effects of soil type, P source (MAP or TSP), and P rate (0-2.75 kg P/m3) on soil salinity, soil acidity, and apple tree growth in nonleaching soil systems during a 56-d period after planting. Rootstock and old scion masses were not affected by soil type or P treatments. In the Quincy sand, new scion mass and root mass were inversely related to P rate in both MAP- and TSP-amended soil; tree death occurred at P rates above 1.65 kg/m3. In the Cowiche soil, root mass was independent of and new scion mass was inversely related to P rate. At equivalent P rates, TSP produced lower soil salinity and greater soil acidity than MAP. For a given P source, soil salinity and acidity were positively related to P rate. Soil salinity decreased and soil pH increased over time. Relative new scion mass was inversely related to time-integrated soil salinity; however, the relationships were soil-specific. Total exchangeable soil acidity was positively related to P rate and was soil-dependent. Exchangeable soil Al was detected only at the two highest TSP rates in the Quincy soil. Indirect evidence suggested that Mn, NH3, and NO2 phytotoxicities and any nutrient deficiencies were absent. The results suggest that transient soil salinization is the primary mechanism for MAP- and TSP-induced apple tree phytotoxicity. Soil Science Society of America journal. Nov/Dec 1990. v. 54 (6). p. 1778-1783. Includes references. (NAL Call No.: DNAL 56.9 SO3).

1311

Reduction in transpiration and return bloom in apple by two sterol-inhibiting fungicides.
HJHSA. Biggs, A.R. Alexandria, Va. : American Society for Horticultural Science. HortScience. Nov 1990. v. 25 (11). p. 1403-1405. Includes references. (NAL Call No.: DNAL SB1.H6).

1312

The relationship of internal bark necrosis in 'Delicious' apples to tree characteristics and soil properties.
CSOSA2. Hoyt, P.B. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. May/Sept 1988. v. 19 (7/12). p. 1041-1048. Includes references. (NAL Call No.: DNAL S590.C63).

1313

Replanting old orchard soils--a panel.
PWHAA. Tvergyak, P. Stevens, B.; Slykhuis, J.; Smith, T.; Ley, T.; Barritt, B.H. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 131-169. ill. (NAL Call No.: DNAL 81 W273).

1314

Some soil quality factors in relation to replant.
PWHAA. Smith, T.J. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 146-151. ill. (NAL Call No.: DNAL 81 W273).

1315

Stability of selected pesticide formulations and combinations in aqueous media.
JAFCAU. Atwood, S.T. Sheets, T.J.; Sutton, T.B.; Leidy, R.B. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Mar/Apr 1987. v. 35 (2). p. 169-172. Includes references. (NAL Call No.: DNAL 381 J8223).

1316

'Stayman' fruit cracking as affected by surfactants, plant growth regulators, and other chemicals.
JOSHB. Byers, R.E. Carbaugh, D.H.; Presley, C.N. Alexandria, Va. : The Society. Submerging 'Stayman' apples in nonionic and anionic surfactant-water solutions caused increased water uptake and fruit cracking. The primary sites of water uptake were lenticels and injured areas of the fruit cuticle. Fruit cracking caused by submerging fruit in 1.25 ml X-77/liter surfactant was used to predict the natural cracking potential of 'Stayman' strains and apple cultivars in the field. Submerging apples in aqueous pesticide mixtures did not increase fruit cracking or water uptake. Fruit cracking and uptake of surfactant-water were not correlated between apple cultivars. In a surfactant-water bath, 'Starkrimson Delicious' absorbed more water than 'Stayman', 'York', 'Jonathan', and 'Golden Delicious'; no 'Starkrimson Delicious' fruits cracked, but 32% to 80% of the other cultivars did. In field tests, four airblast spray applications of GA(4+7), in July and Aug. 1987 reduced fruit cracking from 56% to 21%, and five applications in July, Aug., and Sept. 1988 reduced fruit cracking from 93% to 75%. In 1987, daminozide reduced cracking, but, in 1988, neither daminozide, NAA, nor Vapor Gard alone reduced cracking. However, in 1988, a combination treatment of GA(4+7), daminozide, NAA, and Vapor Gard reduced fruit cracking from 93% to 22%. Also, two scorings of the trunk with a carpet knife reduced fruit cracking 22%. Journal of the American Society for Horticultural Science. May 1990. v. 115 (3). p. 405-411. Includes references. (NAL Call No.: DNAL 81 SO12).

1317

Study of impact and compression damage on Asian pears.
Chen, P. Ruiz, M.; Lu, F.; Kader, A.A. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1986 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1986. (fiche no. 86-3025). 20 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

1318

Undertree sprinkling for low temperature modification in apple orchards.
Davies, D.L. Evans, R.G.; Campbell, G.S.; Kroeger, M.W. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-2558). 26 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

1319

Use of greenhouse seedling bioassays to predict first year growth of apple trees planted in old orchard soil.
HJHSA. Nielson, G.H. Beulah, J.; Hogue, E.J.; Utkhede, R.S. Alexandria, Va. : American Society for Horticultural Science. Apple seedling height after 7 weeks of growth in greenhouse pots was compared with total first year shoot growth of 'McIntosh' or 'Delicious' apple trees Malus domestica (Borkh.) on M.26 rootstock for eight orchards and five soil treatments. The apple trees were replanted in old orchard sites with the same treatments applied in the planting hole as were tested in the greenhouse. The pot test successfully predicted treatments that increased first year shoot growth in 23 of 30 opportunities. However, a less precise relationship (R^2 = 0.38) existed between total first year shoot growth (Y) of 'Summerland Red McIntosh' on M.26 rootstock and seedling height (X). HortScience. Nov 1991. v. 26 (11). p. 1383-1386. Includes references. (NAL Call No.: DNAL SB1.H6).

1320

Analysis of impacts recorded with an instrumented sphere.
Klug, B.A. Tennes, B.R.; Zapp, H.R. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Drder Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-3514). 18 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

1321

Apple impact bruise prediction models.
Siyami, S. Brown, G.K.; Burgess, G.J.; Gerrish, J.B.; Tennes, B.R.; Burton, C.L.; Zapp, H.R. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Drder Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Drder Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-6019). 22 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

1322

Apple packing line damage assessment.
Brown, G.K. Burton, C.L.; Sargent, S.A.; Schulte Pason, N.L. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Drder Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Drder Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-6515). 19 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

1323

Avoid apple bruising.
WEFGA. Aylsworth, J. Willoughby, Dhio : Meister Publishing Company. Western fruit grower. This publication is not owned by the National Agricultural Library. Nov 1988. v. 108 (1). p. 14, 16-17. ill. (NAL Call No.: DNAL 80 G85W).

1324

Biocontrol of postharvest diseases of apples with antagonist mixtures.
PHYTAJ. Janisiewicz, W.J. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Feb 1988. v. 78 (2). p. 194-198. Includes references. (NAL Call No.: DNAL 464.8 P56).

1325

Biological control of blue mold and gray mold on apple and pear with Pseudomonas cepacia.
PHYTAJ. Janisiewicz, W.J. Roitman, J. St. Paul, Minn. : American Phytopathological Society. Control of gray mold, caused by Botrytis cinerea, and reduction in blue mold, caused by Penicillium expansum, was obtained on Golden Delicious apples and Bosc pears protected with Pseudomonas cepacia isolated from apple leaves. The bacterium strongly inhibited fungal growth during in vitro screening on nutrient yeast dextrose agar medium. An effective antifungal compound was isolated from the bacterial cells and culture medium. This compound, identified as a pyrrolnitrin, inhibited growth of both fungi at a concentration of 1 mg/L during an agar diffusion test in vitro. Complete control of gray mold was obtained on apples and pears protected with a pyrrolnitrin concentration of 10 mg/L at a pathogen inoculum level of 10(3)-10(5) conidia/ml. Blue mold was controlled at the same concentration of pyrrolnitrin at inoculum concentrations of 10(3) conidia/ml for pears and 10(3) and 10(4) conidia/ml for apples. At concentrations of 50 mg/L or higher, complete control was obtained of both diseases on both fruits at all tested inoculum levels. Phytopathology. Dec 1988. v. 78 (12,pt.2). p. 1697-1700. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1326

Biological control of postharvest diseases of fruit: inhibition of Botrytis rot on apple by an antagonistic yeast.
EMSPA. Wisniewski, M. Wilson, C.; Chalutz, E.; Hershberger, W. San Francisco, Calif. : San Francisco Press, Inc. Proceedings ... annual meeting, Electron Microscopy Society of America. 1988. (46). p. 290-291. ill. Includes references. (NAL Call No.: DNAL QH201.E4).

1327

Bruising impact data acquisition and analysis in apple packing and handling systems utilizing the instrumented sphere (IS).
Tennes, B.R. Zapp, H.R.; Marshall, D.E.; Armstrong, P.R. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Drder Dept.,

2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-6032). 14 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

1328

Bruising research with the instrumented sphere.
NEMFA. Brown, G.K. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held at the Sheraton Sturbridge Resort and Conference Center on January 30 and 31, 1991. 1991. (97th). p. 119-126. Includes references. (NAL Call No.: DNAL 81 M384).

1329

Comparison of normal strains and shear stresses at fracture in uniaxial compression and in a hemispheroid geometry.
TAAEA. Diehl, K.C. Ordonez, G.P.; Neo, T.H. St. Joseph, Mich. : The Society. Transactions of the ASAE - American Society of Agricultural Engineers. May/June 1986. v. 29 (3). p. 883-887. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1330

Control of Penicillium blue mold by post harvest dip treatments, 1984-85.
FNETD. Yoder, K.S. Cochran A.E. II; Schmidt, C.M. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 1-2. (NAL Call No.: DNAL 464.9 AM31R).

1331

Controlling apple storage scald.
MUCBA. Dewey, D.H. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. May 1986. (1015). 2 p. (NAL Call No.: DNAL 275.29 M58B).

1332

Damage assessment for apple harvest and transport.
Sargent, S.A. Brown, G.K.; Burton, C.L.; Pason, N.L.S.; Timm, E.J.; Marshall, D.E. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-6517). 11 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

1333

Damage reduction in mechanical apple-harvesting.
Bennedsen, B.S. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1986 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1986. (fiche no. 86-1071). 13 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

1334

Development, persistence, survival, and strategies for control of thiabendazole-resistant strains of Penicillium expansum on pome fruits.
PHYTAJ. Prusky, D. Bazak, M.; Ben-Arie, R. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Aug 1985. v. 75 (8). p. 877-882. Includes 21 references. (NAL Call No.: DNAL 464.8 P56).

1335

Disorders in apple and pear shipments to the New York Market, 1972-1984.
PLDRA. Cappellini, R.A. Ceponis, M.J.; Lightner, G.W. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1987. v. 71 (9). p. 852-856. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Dynamics of benzimidazole-resistant penicillia in the development of postharvest decays of citrus and pome fruits.
Eckert, J.W. St. Paul, Minn. : ARS Press, American Phytopathological Society, 1988. Fungicide resistance in North America / Charles J. Delp, editor. p. 31-35. ill. (NAL Call No.: DNAL SB951.F88).

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Effect of imazalil on pathogenicity of Penicillium spp. causing storage rots of pome fruits.
PLDIDE. Prusky, D. Ben-Arie, R. St. Paul, Minn. : American Phytopathological Society. Plant disease. May 1985. v. 69 (5). p. 416-418. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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The effect of impact bruising on apples and subsequent decay development.
Burton, C.L. Pason, N.L.S.; Brown, G.K.; Timm, E.J. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-6516). 15 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

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Effect of inoculum concentration and salt solutions on biological control of postharvest diseases of apple with Candida sp.
PHYTA. McLaughlin, R.J. Wisniewski, M.E.; Wilson, C.L.; Chalutz, E. St. Paul, Minn. : American Phytopathological Society. Two osmotolerant strains (87 and 101) of the yeast, Candida sp., were tested for ability to reduce lesion development in Golden Delicious apple after challenge with 10(5) or 10(4) conidia per milliliter of the postharvest pathogens Botrytis cinerea and Penicillium expansum. Lesion size and frequency of Botrytis rot were significantly less in fruit pretreated with aqueous suspensions of strains 87 and 101 (10(7) and 10(8) colony-forming units cfu /ml) as compared with controls pretreated with water. Significant, but marginal, reduction of Penicillium rot was observed in treatments with these yeasts at 10(8) cfu/ml. Biological control of Botrytis rot was enhanced when wounds were treated with strain 87 at 10(7) cfu/ml in 2% (w/v) aqueous solutions of CaCl2, KCl, and CACO3, as compared with aqueous suspensions of the strain alone. Salt solutions applied to wounds without yeast cells did not reduce rot. The ability of the salt solutions to enhance control with yeasts was not related to the osmotic potential of the solutions. Calcium chloride was the most effective salt. Yeast strains differed slightly in their response to calcium chloride; a 1% concentration enhanced biocontrol with strain 87, whereas a 2% concentration was necessary to enhance control with strain 101. Calcium chloride facilitated control of Botrytis rot with yeast populations as low as 10(6) cfu/ml. Decay due to Penicillium expansum also was significantly reduced when fruit were treated with strains 87 and 101 in the presence of calcium chloride. Phytopathology. May 1990. v. 80 (5). p. 456-461. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Effect of preharvest pear fruit maturity on decay resistance.
PLDIDE. Spotts, R.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. May 1985. v. 69 (5). p. 388-390. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1341

Effects of controlled atmosphere and calcium infiltration on decay of Delicious apples.
PLDRA. Sams, C.E. Conway, W.S. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1985. v. 69 (9). p. 747-750. Includes 24 references. (NAL Call No.: DNAL 1.9 P69P).

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Effects of fruit maturity, size, and mineral concentrations on predicting the storage life of 'McIntosh' apples.
JOSHB. Marmo, C.A. Bramlage, W.J.; Weis, S.A. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. July 1985. v. 110 (4). p. 499-502. Includes 15 references. (NAL Call No.: DNAL 81 SO12).

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Effects of heat treatments on populations of four fruit decay fungi in sodium ortho phenylphenate solutions.
PLDIDE. Spotts, R.A. Cervantes, L.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1985. v. 69 (7). p. 574-576. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1344

Effects of high temperatures on the survival and pathogenicity of propagules of Mucor piriformis.
PHYTA. Michailides, T.J. Ogawa, J.M. St. Paul, Minn. : American Phytopathological Society. Survival of mycelia and sporangiospores of Mucor piriformis (California isolate CA and Chile isolate CH) were compared at temperatures of 35-60 C. The thermal death points of the mycelia and sporangiospores were 46 and 55 C, respectively, for isolate CA and 43 and 52 C, respectively, for isolate CH. After a 2-day incubation at 27 C, both isolates exhibited yeast-like growth on agar medium. Sporangiospore germination was erratic at 27 C and, when subsequently incubated at 21 C, germ tubes were abnormally swollen and produced no viable colonies. Reduction in viability was greater in wet than in dry sporangiospores. Preincubation of sporangiospores in dry (-1,300 bars matric potential) or wet (-0.3 bar matric potential) soil at 27 or 33 C for 15 days followed by incubation at 21 C for 45 days

resulted in significantly lower viability in both isolates than in sporangiospores incubated continuously at 21 C for 60 days at both water potentials. Preincubation of sporangiospores at 33 C for 15 days resulted in a faster decline in survival than preincubation at 27 C for 15 days followed by 21 C for 45 more days. Pear fruits wound-inoculated with M. piriformis and dipped in 47 C water for 30 min had 1-5% infected wounds, whereas fruits inoculated in the same way and dipped for 30 min in water at 21 C had 90% of the wounds infected. Results from this study suggest that hot water treatment of fruit may reduce inoculum levels and postharvest infection. Phytopathology. May 1989. v. 79 (5). p. 547-554. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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The effects of postharvest infiltration of calcium, magnesium, or strontium on decay, firmness, respiration, and ethylene production in apples.
JOSHB. Conway, W.S. Sams, C.E. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Mar 1987. v. 112 (3). p. 300-303. Includes references. (NAL Call No.: ONAL 81 SO12).

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Effects of sequential low-oxygen and standard controlled atmosphere storage regimens on apple quality.
JOSHB. Lidster, P.O. Lougheed, E.C.; McRae, K.B. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Sept 1987. v. 112 (5). p. 787-793. Includes references. (NAL Call No.: ONAL 81 SO12).

1347

Effects of several postharvest fungicide treatments on the quality and ripeness of cold-stored apples.
JAFCAU. Cano, M.P. De la Plaza, J.L.; Munoz-Delgado, L. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Mar/Apr 1989. 37 (2). p. 330-333. Includes references. (NAL Call No.: ONAL 381 J8223).

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Efficacy of new benzimidazole fungicides against sensitive and benomyl-resistant Botrytis cinerea.
PHYTAJ. Chiba, M. Northover, J. St. Paul, Minn. : American Phytopathological Society. Phytopathology. May 1988. v. 78 (5). p. 613-618. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Evaluating fungicides for control of postharvest decay of pome fruits.
Rosenberger, D.A. Spotts, R.A.; Conway, W.S.; Yoder, K.S. St. Paul, Minn. : APS Press, c1986. Methods for evaluating pesticides for control of plant pathogens / edited by Kenneth D. Hickey ; prepared jointly by the American Phytopathological Society and the Society of Nematologists. p. 88-91. Includes references. (NAL Call No.: ONAL SB960.M47 1986).

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Evaluation of disinfestant-flotation salt-surfactant combinations on decay fungi of pear in a model dump tank.
PHYTAJ. Spotts, R.A. Cervantes, L.A. St. Paul, Minn. : American Phytopathological Society. Several disinfestant-flotation salt-surfactant solutions were compared for effect on germination of spores of Mucor piriformis, Penicillium expansum, and Phialophora malorum and decay of pear caused by these fungi after exposure to a 7-hr dynamic circulation and spore addition phase, followed by a 16-hr static phase in a model dump tank. In aqueous systems without soil added to the tank, chlorine at 64 micrograms/ml inhibited germination from 90 to 100% in all salt solutions. Effectiveness of 4,000 micrograms sodium o-phenylphenate (SOPP) per milliliter was highest in calcium and sodium lignin sulfonate and lowest in sodium silicate solution. SOPP was less inhibitory to germination than chlorine during the first 1-3 hr of the dynamic phase. In flotation systems with 6.25 mg/ml of soil, chlorine in sodium sulfate and SOPP in sodium lignin sulfonate inhibited germination of spores and reduced decay of fruit more than in sodium silicate. Inhibition of germination of the three fungi was greater at the end of the static phase than during the dynamic phase in several tests with 10 combinations of disinfestant-flotation salt-surfactant. Phytopathology. Jan 1989. v. 79 (1). p. 121-126. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Evaluation of new postharvest fungicides for control of Penicillium blue mold in stored apples, 1983-85.
FNETD. Rosenberger, D.A. Meyer, F.W. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 1. (NAL Call No.: ONAL 464.9 AM31R).

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Factors affecting dispersal of Mucor piriformis in pear orchards and into the packinghouse.
PLDRA. Michailides, T.J. Spotts, R.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1986. v. 70 (11). p. 1060-1063. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Factors affecting the progressive development of low-oxygen injury in apples.
Lidster, P.D. Blanpied, G.D.; Lougheed, E.C. Raleigh, N.C. : Department of Horticultural Science, North Carolina State University, 1985 . Controlled atmospheres for storages and transport of perishable agricultural commodities : papers presented at the Fourth Natl Controlled Atmosphere Res Conf, July 23-26, 1985, Raleigh, NC / edited by S.M. Blankenship. p. 57-69. Includes references. (NAL Call No.: DNAL SB319.77.N38 1985).

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Harvesting, storing, and handling processing apples.
Massey, L.M. Jr. New York : Van Nostrand Reinhold, c1989. Processed apple products / edited by Donald L. Downing. p. 31-51. ill. Includes references. (NAL Call No.: DNAL TP441.A6P76).

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IMP 1991 commercial apple: insect, disease, and weed control recommendations.
Patterson, M.G. Everest, J.W. Auburn, Ala. : The Service. Circular ANR - Alabama Cooperative Extension Service, Auburn University. In subseries: Integrated Pest Management. Dec 1990. (11). 11 p. (NAL Call No.: DNAL S544.3.A2C47).

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Improving apple bagging equipment.
ARHMA. Marshall, D.E. Brown, G.K.; Wolthuis, R.J. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 181-184. Includes references. (NAL Call No.: DNAL 81 M58).

1357

Influence of fruit maturity and growing district on brown-core disorder in 'Bosc' pears.
HJHSA. Chen, P.M. Borgic, D.M.; Sugar, D.; Mellenthin, W.M. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1986. v. 21 (5). p. 1172-1173. Includes references. (NAL Call No.: DNAL SB1.H6).

1358

Influence of maturity, storage procedure, temperature, and oxygen concentration on quality and disorders of 'McIntosh' apples.
JOSHB. Lau, O.L. Yastremski, R.; Meheriuk, M. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Jan 1987. v. 112 (1). p. 93-99. ill. Includes 18 references. (NAL Call No.: DNAL 81 SO12).

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Inhibition of Penicillium expansum polygalacturonase activity by increased apple cell wall calcium.
PHYTAJ. Conway, W.S. Gross, K.C.; Boyer, C.D.; Sams, C.E. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Aug 1988. v. 78 (8). p. 1052-1055. Includes references. (NAL Call No.: DNAL 464.8 P56).

1360

Inhibition of softening by polyamine application in 'Golden Delicious' and 'McIntosh' apples.
JOSHB. Kramer, G.F. Wang, C.Y.; Conway, W.S. Alexandria, Va. : The Society. Pressure infiltration of 'Golden Delicious' and 'McIntosh 'apples (Malus domestica Borkh.) with polyamines resulted in an immediate increase in firmness. 'Golden Delicious' apples were 2.7 N (0.25 mm spermidine) to 6.7 N (1.0 mm spermine) firmer, while 'McIntosh' apples were 2.2 N (0.25 mm spermidine) to 5.3 N (1.0 mm spermine) firmer than the water-treated control. During 28 weeks of storage at 0C, the differences between the polyamine-treated and water-treated apples were even larger. Similar results were observed with a 3% Ca treatment, but the Ca treatment reduced the rate of softening to a greater extent than did the polyamine treatments in 'Golden Delicious'. Polyamines increased the endogenous levels of the polyamines infiltrated; however, the levels declined rapidly with time in storage. Both polyamine and Ca inhibited the development of chilling injury symptoms (brown core) in 'McIntosh'. The influence of polyamines on ethylene production was negligible in both cultivars. The Ca treatment, however, inhibited ethylene evolution in 'Golden Delicious'. Polyamines, thus, may affect apple softening through rigidification of cell walls rather than through interactions with ethylene metabolism. Journal of the American Society for Horticultural Science. Sept 1991. v. 116 (5). p. 813-817. Includes references. (NAL Call No.: DNAL 81 SO12).

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Integrated management of postharvest diseases and disorders of apples, pears and cherries.
Willett, M. Kupferman, G.; Roberts, R.; Spotts, R.; Sugar, D.; Apel, G.; Ewart, H.W.; Bryant, B. Pullman, Wash. : Washington State University Cooperative Extension. Postharvest pomology newsletter. Dec 1989. v. 7 (3). 16 p. (NAL Call No.: DNAL TP440.P67).

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Latent damage in apples and peaches.
Prussia, S.E. Hung, Y.C.; Shewfelt, R.L.; Jordan, J.L. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-6520). 13 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

1363

Mating types of Mucor piriformis isolated from soil and pear fruit in Oregon orchards (on the life history of Mucor piriformis).
MYCOAE. Michailides, T.J. Spotts, R.A. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Sept/Oct 1986. v. 78 (5). p. 766-770. ill. Includes references. (NAL Call No.: DNAL 450 M99).

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Model for failure and plastic-flow in fruit collision.
Gan-Mor, S. Galili, N. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-6021). 12 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

1365

Mucor rot and blue mold.
Spotts, R.A. Pullman, Wash. : Washington State University Cooperative Extension. Postharvest pomology newsletter. Sept 1989. v. 7 (2). p. 8-9. (NAL Call No.: DNAL TP440.P67).

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A new chlorinated phenylpyrrole antibiotic produced by the antifungal bacterium Pseudomonas cepacia.
JAFCAU. Roitman, J.N. Mahoney, N.E.; Janisiewicz, W.J.; Benson, M. Washington, D.C. : American Chemical Society. A group of chlorinated phenylpyrrole derivatives was isolated from a strain of Pseudomonas cepacia collected from apple leaves during a screening program designed to detect agents for biological control of fruit spoilage fungi. One of these substances, 2,3-dichloro-4-(2-amino-3-chlorophenyl)pyrrole, has not been previously reported. In vitro testing showed that all four of the phenylpyrroles had antifungal activity toward several fruit pathogens. The new phenylpyrrole showed fungal inhibitory effects on Golden Delicious apples inoculated with conidia of pathogenic organisms. An unrelated but known compound, 2-(2-heptenyl)-3-methyl-4(1H)-quinolone, was also isolated. Journal of agricultural and food chemistry. Feb 1990. v. 38 (2). p. 538-541. Includes references. (NAL Call No.: DNAL 381 J8223).

1367

Pathogenicity and benzimidazole resistance in Penicillium species recovered from flotation tanks in appled packinghouses.
PLDIDE. Rosenberger, D.A. Wicklow, D.T.; Korjagin, V.A.; Rondinaro, S.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1991. v. 75 (7). p. 712-715. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1368

Penicillium solitum revived, and its role as a pathogen of pomaceous fruit.
PHYTA. Pitt, J.I. Spotts, R.A.; Holmes, R.J.; Cruickshank, R.H. St. Paul, Minn. : American Phytopathological Society. Penicillium solitum, a species neglected in recent taxonomies, is revived. A new description and related taxonomic information are given, based on examination of a number of fresh isolates from pome fruit and wooden fruit bin surfaces in Australia and from processed meats in Germany. Isolates of P. solitum were less virulent on apple and pear fruits than those of P. expansum, the dominant pathogenic Penicillium on pome fruits. P. solitum and P. expansum showed similar temperature growth curves, but growth of P. solitum was slower. All isolates of P. solitum from fruit and fruit storage bins in this study were insensitive to benomyl, but isolates from meat and cheese were sensitive to benomyl. Phytopathology. Oct 1991. v. 81 (10). p. 1108-1112. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Physiological effects of waxing on apples.
NEMFA. Bramlage, W.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1986. v. 92. p. 111-113. Includes 6 references. (NAL Call No.: DNAL 81 M384).

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Populations, pathogenicity, and benomyl resistance of Botrytis spp., penicillium spp., and Mucor piriformis in packinghouses.
PLDRA. Spotts, R.A. Cervantes, L.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. Feb 1986. v. 70 (2). p. 106-108. Includes 16 references. (NAL Call No.: DNAL 1.9 P69P).

1371

Post-harvest disorder control.
MUCBA. Jones, A.L. Burton, C.L. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Dec 1986. (E-154). p. 78-79. (NAL Call No.: DNAL 275.29 M58B).

1372

Postharvest biological control of blue mold on apples.
PHYTAJ. Janisiewicz, W.J. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Mar 1987. v. 77 (3). p. 481-485. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1373

Postharvest biological control of gray mold of apple by Cryptococcus laurentii.
PHYTA. Roberts, R.G. St. Paul, Minn. : American Phytopathological Society. Cryptococcus laurentii is a basidiomycetous yeast that occurs naturally on apple leaves, buds, and fruit. Puncture wounds in surface-disinfested cultivar Golden Delicious apple fruit were treated with phosphate buffer, cell suspensions of C. laurentii, or benomyl, then inoculated with 2 X 10(4) conidia per milliliter of Botrytis cinerea and incubated 12 days at 5, 10, 15, or 20 C. Treatment of wounds with washed cells of C. laurentii at 10(4)-10(5) cells per wound effectively reduced or prevented development of decay by B. cinerea at all temperatures compared with controls and was comparable in effectiveness to preinoculation application of benomyl at the postharvest label rate. Treatment of wounds with cell-free culture filtrates of C. laurentii were not effective in preventing decay and resulted in greater lesion diameters than in inoculated, buffer-treated wounds. As the interval between wounding and inoculation with B. cinerea increased from 0 to 72 hr, susceptibility of wounds to decay by B. cinerea decreased. Population densities of C. laurentii in wounds increased rapidly, even at 5 C, and were never associated with necrosis or discoloration of host tissue. Phytopathology. June 1990. v. 80 (6). p. 526-530. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Postharvest calcium treatment of apple fruit to provide broad-spectrum protection against postharvest pathogens.
PLDIDE. Conway, W.S. Sams, C.E.; Abbott, J.A.; Bruton, B.D. St. Paul, Minn. : American Phytopathological Society. Plant disease. June 1991. v. 75 (6). p. 620-622. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Postharvest calcium treatments: potential benefits and risks.
NEMFA. Bramlage, W.J. Weis, S.A. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1986. v. 92. p. 106-109. Includes 5 references. (NAL Call No.: DNAL 81 M384).

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Postharvest control of blue mold and gray mold of apples and pears by dip treatment with pyrrolnitrin, a metabolite of Pseudomonas cepacia.
PLDIDE. Janisiewicz, W. Yourman, L.; Roitman, J.; Mahoney, N. St. Paul, Minn. : American Phytopathological Society. Plant disease. May 1991. v. 75 (5). p. 490-494. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Postharvest diseases of pome and stone fruits caused by Mucor piriformis in the Pacific Northwest and California.
PLDIDE. Michailides, T.J. Spotts, R.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. Aug 1990. v. 74 (8). p. 537-543. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Postharvest handling systems: temperate fruits.
Mitchell, F.G. Berkeley, Calif. : Coop Ext, Univ of California, Div of Agric and Natural Resources, 1985. Postharvest technology of horticultural crops / Adel A. Kadar et al. . p. 143-148. ill. Includes references. (NAL Call No.: DNAL SB319.7.P67).

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Predicting the occurrence of poststorage disorders of 'McIntosh' apples from preharvest mineral analyses.
JOSHB. Bramlage, W.J. Weis, S.A.; Drake, M. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. July 1985. v. 110 (4). p. 493-498. Includes 23 references. (NAL Call No.: DNAL 81 SO12).

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Prestorage heat treatment for control of decay of pear fruit.
PHYTAJ. Spotts, R.A. Chen, P.M. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Nov 1987. v. 77 (11). p. 1578-1582. Includes references. (NAL Call No.: DNAL 464.8 P56).

1381

Quality of apples and sooty blotch and flyspeck incidence at harvest and after storage, 1984-85.
FNETD. Brown, E.M. Sutton, T.B.; Unrath, C.R. s.l. : The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 26. (NAL Call No.: DNAL 464.9 AM31R).

1382

Relationships between inoculum concentrations of three decay fungi and pear fruit decay.
PLDRA. Spotts, R.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. May 1986. v. 70 (5). p. 386-389. Includes 11 references. (NAL Call No.: DNAL 1.9 P69P).

1383

Removal of sooty blotch and flyspeck from apple fruit with a chlorine dip.
PLDIDE. Hendrix, F.F. Jr. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1991. v. 75 (7). p. 742-743. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1384

Residues of benomyl (determined as carbendazim) and captan in postharvest-treated pears in cold storage.
JAFCAU. Kiigemagi, U. Inman, R.D.; Mellenthin, W.M.; Deinzer, M.L. Washington, D.C. : American Chemical Society. Residues of carbendazim (applied as benomyl) and captan, applied to pears prior to cold storage, were examined during 6 months of storage. Total carbendazim residues were below the 7 ppm tolerance, initial residues averaging 0.37 ppm, and no reduction of residues was detected during cold storage. In another study, three postharvest application techniques were compared and again no significant differences in the quantities of the residues found. Captan residues on Anjou pears were insignificant. The analytical procedure used for these analyses was an acetone extraction of acidified pear puree followed by partitioning with ethyl acetate to separate total carbendazim (benomyl plus carbendazim) and captan residues. For captan residue, charcoal and silica gel cleanup of the organic extract was followed by electron capture GLC. The pH of the aqueous extract containing carbendazim was adjusted to about 9 with sodium hydroxide, and the carbendazim residue was partitioned into ethyl acetate and analyzed by HPLC. Journal of agricultural and food chemistry. Feb 1991. v. 39 (2). p. 400-403. Includes references. (NAL Call No.: DNAL 381 J8223).

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Response of apple cultivars to fumigation with methyl bromide.
HJHSA. Meheriuk, M. Gaunce, A.P.; Dyck, V.A. Alexandria, Va. : American Society for Horticultural Science. HortScience. May 1990. v. 25 (5). p. 538-540. Includes references. (NAL Call No.: DNAL SB1.H6).

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Soil contamination inconsistently affects performance of diphenylamine as a superficial scale inhibitor.
HJHSA. Ingle, M. Morris, J.C.; D'Souza, M.C. Alexandria, Va. : American Society for Horticultural Science. HortScience. Nov 1990. v. 25 (11). p. 1414-1415. Includes references. (NAL Call No.: DNAL SB1.H6).

1387

Spectral analysis of acoustical signal for damage detection.
Upchurch, B.L. Furgason, E.S.; Miles, G.E. St. Joseph, Mich. : The Society. Paper - American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1985 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road,. Summer 1985. (fiche no. 85-6014). 13 p. (NAL Call No.: DNAL FICHE 290.9 AM32P).

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Ultrasonic measurement for detecting apple bruises.
TAAEA. Upchurch, B.L. Miles, G.E.; Stroshine, R.L.; Furgason, E.S.; Emerson, F.H. St. Joseph, Mich. : The Society. Transactions of the ASAE - American Society of Agricultural Engineers.

May/June 1987. v. 30 (3). p. 803-809. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

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Waxing equipment and materials.
NEMFA. Lacasse, S.T. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1986. v. 92. p. 114-116. (NAL Call No.: DNAL 81 M384).

1390

Effect of trap design, trap height, and habitat on the capture of sap beetles (Coleoptera: Nitidulidae) using whole-wheat bread dough.
JEENAI. Peng, C. Williams, R.N. Lanham, Md. : Entomological Society of America. Nine trap designs were compared for capturing sap beetles: Lindgren funnel, Multi-Pher I, Skalbeck, Unitrap, Japanese beetle, liquid, water pan, cone, and McPhail. The Lindgren funnel was most effective for Glischrochilus fasciatus (Olivier) and G. quadrisignatus (Say). The Lindgren funnel, Multi-Pher, Skalbeck, moth, and liquid trap all caught equal numbers of Carpophilus lugubris Murray. The Skalbeck is recommended because of its low cost. G. fasciatus, G. quadrisignatus, and C. lugubris flew to higher traps in apple orchards than in open grassy areas. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1515-1519. Includes references. (NAL Call No.: DNAL 421 J822).

1391

Effects of cobalt gamma radiation on San Jose scale (Homoptera: Diaspididae) survival on apples in cold and controlled-atmosphere storage.
JEENAI. Angerilli, N.P.D. Fitzgibbon, F. Lanham, Md. : Entomological Society of America. 'Red Delicious' apples (Malus pumila (Mill.)) infested with San Jose scale, Quadraspidiotus perniciosus (Comstock), harvested from commercial and experimental orchards were subjected to cobalt-60 gamma radiation and then stored in either regular cold storage, controlled-atmosphere storage, or at room temperature. Scale survival measured at various intervals after treatment declined with time and the magnitude of the radiation dose received. Survival was not influenced by method of storage. Journal of economic entomology. June 1990. v. 83 (3). p. 892-895. Includes references. (NAL Call No.: DNAL 421 J822).

1392

Gamma irradiation as a quarantine treatment for apples infested by codling moth (Lepidoptera: Tortricidae).
JEENAI. Burditt, A.K. Jr. Hungate, F.P. Lanham, Md. : Entomological Society of America. Codling moth, Cydia pomonella (L.) larvae reared on thinning apples were exposed to gamma radiation at incremental doses up to 138 Gy (gray). Adult emergence from pupae was reduced, and larval mortality increased as dose increased. At a dose of 39.2 Gy, emergence of normal adults from irradiated younger larvae (first through third instars) was reduced, and emergence of physically deformed adults increased. At higher doses, adult emergence was further reduced, the ratio of male to female emergence increased significantly, and overall survival of larvae declined. Similar results were obtained for older larvae (third through fifth instars) except that tbe doses required for comparable effects were 10-25% higher than those for younger larvae. These data suggest that doses of 372 Gy would prevent first through third instars from maturing and forming cocoons. However, probit analysis showed that a dose of 187 Gy or less gave quarantine security based on preventing adult emergence from fruit infested by larvae. When an estimated 79,540 nondiapausing immature larvae infesting thinning apples were exposed to approximately 153 Gy, only 15,501 formed cocoons; of these, only 256 pupated and none emerged as adults. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1386-1390. Includes references. (NAL Call No.: DNAL 421 J822).

1393

Low-temperature storage as a postharvest treatment for coding moth (Lepidoptera: Tortricidae) eggs on apple.
JEENAI. Moffitt, H.R. Burditt, A.K. Jr. Lanham, Md. : Entomological Society of America. Complete mortality of red ring stage eggs of the codling moth, Cydia pomonella (L.), on mature apples occurred with 36-42 d exposure to 0.1-2.1 degrees C. Based on these results and those from previous studies, we propose a minimum of 55 d at less than or equal to 2.2 degrees C as a postharvest treatment for Malus domestica Borkh. cv. Red Delicious and Golden Delicious apples. In large-scale efficacy tests of this treatment, none of the treated 35,203 red ring stage eggs survived. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1679-1681. Includes references. (NAL Call No.: DNAL 421 J822).

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Methyl bromide fumigation and cold storage as treatments for California stone fruits and pears infested with the Caribbean fruit fly (Diptera: Tephritidae).
JEENAI. Benschoter, C.A. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1665-1667. Includes references. (NAL Call No.: DNAL 421 J822).

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Status of efforts to meet Japanese import quarantine requirements for apples.
WSEPA. Moffitt, H. Pullman, Wash. : The Society. Proceedings of the Washington State Entomological Society. Meeting held on April 23 and September 17, 1988, Yakima, Washington. 1988. (50). p. 863-864. (NAL Call No.: DNAL QL461.W3).

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Agricultural chemicals for North Carolina apples.
Walgenbach, J.F. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. Jan 1989. (37,rev.). 38 p. ill. (NAL Call No.: DNAL S544.3.N6N62).

1397

Control of Virginia creeper (Parthenocissus quinquefolia): effects of carrier volume on toxicity and distribution of triclopyr.
WETEE9. Tworkoski, T.J. Young, R.S.; Sterrett, J.P. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Jan 1988. v. 2 (1). p. 31-35. Includes references. (NAL Call No.: DNAL SB610.W39).

1398

The effect of bentazon on the control of yellow nutsedge in trees and vines.
Lange, A.H. Oliver, R.; Lange, K.F. S.l. : Western Society of Weed Science. Research progress report - Western Society of Weed Science. 1987. p. 90-91. (NAL Call No.: DNAL 79.9 W52R).

1399

Effect of phytotoxins produced by Botryosphaeria obtusa, the cause of black rot of apple fruit and frogeye leaf spot.
PHYTA. Venkatasubbaiah, P. Sutton, T.B.; Chilton, W.S. St. Paul, Minn. : American Phytopathological Society. Botryosphaeria obtusa, which causes black rot of apple fruit and frogeye leaf spot, produced phytotoxins in culture, infected fruit, and spore germination fluids. Mellein was the most abundant toxin isolated from the culture fluid. Other toxins isolated were tyrosol, 4-hydroxymellein, 5-hydroxymellein, and 4-hydroxybenzaldehyde. Seventeen apple cultivars and eight weed species were used in a leaf bioassay to determine phytotoxicity of the toxins. The apple cultivars, Supergold and Silverspur, were highly sensitive to all toxins. Only three apple cultivars showed moderate resistance to most toxins. There was no correlation between isolate pathogenicity and the amount of toxin production in culture. Among the weed species, prickly sida and morning glory were very sensitive. Extraction of fruit infected with B. obtusa yielded all toxins except 4-hydroxybenzaldehyde. When conidial germination fluids were extracted with solvent, mellein and 4-hydroxymellein could be detected by thin-layer chromatography. Phytopathology. Mar 1991. v. 81 (3). p. 243-247. Includes references. (NAL Call No.: DNAL 464.8 P56).

1400

Foliar herbicide treatments for control of roadside brush.
PNWSB. Lyman, G.T. Kuhns, L.J.; Gover, A.E. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held on January 4-6, 1989, Baltimore, Maryland. 1989. v. 43. p. 74-75. (NAL Call No.: DNAL 79.9 N814).

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Indiana commercial tree fruit spray schedules 1986 / prepared by David L. Matthew ... et al. .
Matthew, David L. West Lafayette, IN : Cooperative Extension Service, Purdue University, 1986? . Abstract: This guide for commercial tree fruit growers includes 1986 Indiana tree fruit spray schedules and pesticide recommendations for apple, peach, cherry, pear and plum crops. It provides information on mite, mouse and weed control, growth regulators, chemical thinning, pesticide handling, safety, and Integrated Pest Management (IPM). 37 p. ; 28 cm. (NAL Call No.: DNAL 275.29 In2Id no.168).

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Influence of orchard floor management on vole and pocket gopher populations and damage in apple orchards.
JOSHB. Sullivan, T.P. Hogue, E.J. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1987. v. 112 (6). p. 972-977. Includes references. (NAL Call No.: DNAL 81 SO12).

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Integrated management of apple pests in North Carolina.
Ritchie, D.F. Sorenson, K.A.; San Julian, G.J.; Skroch, W.A.; Sutton, T.B.; Rock, G.C. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. Mar 1987. (378). 13 p. Includes references. (NAL Call No.: DNAL S544.3.N6N62).

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Interaction of weeds and apple pests.
NEMFA. Coli, W.M. Ciurlino, R. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 52-58. (NAL Call No.: DNAL 81 M384).

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Orchard floor management--research on weed control and sods.
ARHMA. Stiles, W.C. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1987. (117th). p. 28-36. (NAL Call No.: DNAL 81 M58).

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Virginia creeper response from systemic herbicides.
PNWSB. Young, R.S. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held on January 4-6, 1989, Baltimore, Maryland. 1989. v. 43. p. 133-137. Includes references. (NAL Call No.: DNAL 79.9 N814).

1407

Weed control in pecans, apples and peaches.
Taylor, G. Smith, M.W. Stillwater, Okla. : The Service. OSU current report - Oklahoma State University, Cooperative Extension Service. Apr 1990. (6242,rev.). 4 p. (NAL Call No.: DNAL S451.0508).

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Weed control in pecans, apples and peaches.
Gallott, J. Stillwater, Okla. : The Service. OSU current report - Oklahoma State University, Cooperative Extension Service. Feb 1989. (6242,rev.). 4 p. (NAL Call No.: DNAL S451.0508).

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1964-1986 simazine treatments on a Weikert-Berks complex orchard soil.
PNWSB. Young, R.S. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1987. v. 41. p. 145-149. Includes references. (NAL Call No.: DNAL 79.9 N814).

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1988 commercial apple. Insect, disease & weed control guide.
McVay, J.R. Gazaway, W.; Powell, A.; Latham, A.J.; Kouskolekas, C.A.; Patterson, M.G.; Everest, J.W.; . Auburn, Ala. : The Service. Circular ANR - Cooperative Extension Service, Auburn University. In subseries: Integrated Pest Management. Jan 1988. (11). 12 p. ill. (NAL Call No.: DNAL S544.3.A2C47).

1411

1988 Illinois commercial tree fruit spray schedules / prepared by S.M. Ries ... et al. .
Ries, S. M. Urbana : Cooperative Extension Service, University of Illinois at Urbana-Champaign, 1988 . Abstract: This guide for commercial tree fruit growers includes 1988 Illinois tree fruit spray schedules and pesticide recommendations for apple, peach, cherry, pear and plum crops. It provides information on fungicide, insecticide and muticide harvest restrictions, mouse and weed control, growth regulators, chemical thinning, pesticide handling, safety, and Integrated Pest Management (IPM). Cover title.~ "January, 1988"--P. 4 of cover.~ "C-1151 S.". 40 p. ; 28 cm. (NAL Call No.: DNAL SB608.F8N56).

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1413

Acaricide bioassays with spider mites (Acari: Tetranychidae) on pome fruits: evaluation of methods and selection of discriminating concentrations for resistance monitoring.
JEENAI. Knight, A.L. Beers, E.H.; Hoyt, S.C.; Riedl, H. Lanham, Md. : Entomological Society of America. Leaf disk bioassays with the acaricides avermectin B1, fenbutatin oxide, and hexythiazox were conducted with the mite species Panonychus ulmi(Koch), Tetranychus urticae Koch, and T. mcdanieli McGregor collected from apple andpear orchards in Washington. The effects of length of the bioassay period and inclusion of mite walk-off in mortality used to estimate LC50's with fenbutatin oxide and avermectin B1were examined. Correlations between LC50's after 48 and 72 h were significant with bothchemicals. However, large decreases in LC50's with fenbutatin oxide from 48 to 72 h indicatedthat the longer time allowed a more complete assessment of mite mortality. Comparisonof results from closed double-leaf and open single-leaf bioassays with fenbutatin oxidesuggested that mite walk-off should be included in mortality counts. Significant differences inLC50's were found among mite species for hexythiazox and avermectin B1, but not withfenbutatin oxide. P. ulmi was 20 and 2 times more tolerant to hexythiazox and avermectin B1, respectively, than the two Tetranychus species. Correlations among LC50's for acaricideswithin each species were not significant. In addition, partial correlations for species were not significant with LC50's for fenbutatin oxide and hexythiazox and fenbutatin oxide andavermectin B1. Discriminating concentrations for detection of incipient levels of resistance for hexythiazox were established for each species. Discriminating concentrations also were selectedfor the two Tetranychus species for avermectin B1. Journal of economic entomology. Oct 1990. v. 83 (5). p. 1752-1760. Includes references. (NAL Call No.: DNAL 421 J822).

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Agricultural chemicals for North Carolina apples.
Walgenbach, J.F. (ed.). Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. Jan 1988. (37,rev.). 52 p. (NAL Call No.: DNAL S544.3.N6N62).

1415

The alar controversy: how an outraged public banned a carcinogenic chemical.
Hathaway, J.S. Eugene, Or. : The Coalition. Journal of pesticide reform : a publication of the Northwest Coalition for Alternatives to Pesticides. Fall 1990. v. 10 (3). p. 4-6. Includes references. (NAL Call No.: DNAL SB950.2.A1J58).

1416

Alar free and pesticide free.
Silsby, K. Batavia, N.Y. : Agricultural Div. of Coop Extension, Four Western Plain Counties, N.Y. State. Ag impact. June 1989. v. 16 (6). p. 9. (NAL Call No.: DNAL S544.3.N7A45).

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Alar in apples: Facts and fantasies.
Yonkers, N.Y. : The Union. Common concerns about consumption of apples and apple products made from alar-treated fruit and cancer risk are addressed in a question and answer format. Consumer reports - Consumers Union of United States. May 1989. v. 54 (5). p. 291. (NAL Call No.: DNAL 321.8 C762).

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Alar: the numbers game.
SCIEA. Roberts, L. Washington, D.C. : American Association for the Advancement of Science. The dispute over the cancer danger from Alar highlights just how uncertain risk assessment is. Science. Mar 17, 1989. v. 243 (4897). p. 1430. (NAL Call No.: DNAL 470 SCI2).

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Apple and cherry pest control.
Mahr, D.L. Jeffers, S.N.; Binning, L.K.; Stang, E.J. Madison, Wis. : The Research Division. Publication - Cooperative Extension Programs. University of Wisconsin - Extension. 1986. (A3314). 24 p. ill. (NAL Call No.: DNAL S544.3.W6W53).

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Apple sales strong despite scarce in '89 about chemical use.
NYTIA0. Shabecoff, P. New York, N.Y. : H.J. Raymond & Co. . The New York times. Nov 13, 1990. p. A1, A11. (NAL Call No.: DNAL 286.8 N488).

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Apple scab management /C. Pickel and R.S. Bethell.
Pickel, C. Bethell, R. S. Berkeley, Calif. : Cooperative Extension, University of California, Division of Agriculture and Natural Resources, 1985? . Abstract: This leaflet, for growers and advisors, describes the symptoms and disease cycle of apple scab and provides management guidelines including cultural and chemical control. Tables provide information on temperature and moisture requirements for apple scab infection and currently registered chemicals for control of apple scab. Caption title. 4 p. : ill. ; 28 cm. (NAL Call No.:

DNAL S544.3.C2C3 no.21412).

1422

Apples: managing pesticides for crop production and water quality protection--a supplement to the IFAS Pest Control Guides.
Hornsby, A.G. Buttler, T.M.; Crocker, T.E.; Mizell, R.F. III; Dunn, R.A.; Simone, G.W. Gainesville, Fla. : The Service. Circular - Florida Cooperative Extension Service. In subseries: Water Quality Initiative Series. May 1991. (962). 11 p. (NAL Call No.: DNAL 275.29 F66C).

1423

Assessment of pesticide residues in surface and soil water from a commerical apple orchard.
AAREEZ. Weaver, J.E. Hogmire, H.W.; Brooks, J.L.; Sencindiver, J.C. New York, N.Y. : Springer. Soil water in the vadose zone and surface runoff water in a commercial apple orchard in an upland area of West Virginia were assessed for residues of pesticides normally applied for control of diseases, arthropod pests, and vole control. Water in the vadose zone was sampled at depths of 6, 12, 24, and 36 in. (0.15, 0.3, 0.6, and 0.9 m) with suction lysimeters from early spring to midfall for two consecutive years. Endrin was the only pesticide detected; it had been applied to the study site five times during the period of 1974 to 1981. None of the 17 pesticides applied under an Integrated Orchard Management program during this study were detected in water samples. Concentrations of endrin in soil water ranged from 0.1 to 13.2 ppb (microgram/L). About 20% of all soil water samples within the orchard tested positive (greater than or equal to 0.1 ppb) for this pesticide. Endrin was detected at all depths; however, the frequency of positive samples and levels of residues tended to decrease with depth of sampling. Only 4.3% of soil water samples collected offsite (105 ft downslope from the orchard) contained endrin; concentrations were less than 0.1 and 0.5 ppb in two samples from the 6-in depth. Endrin concentrations in soil from within the orchard were highly variable among the sites sampled. Mean concentrations (+/- SD) at surface (0-1 in.), 6, 12, 24, and 36 in. were 12,100 (+/- 11,200), 900 (+/- 800), 1,700 (+/- 1,800), 200 (+/- 300), and less than 10 (+/- 10) ppb (microgram/kg), respectively. Off-site (one sample), endrin was detected only at the surface and 6-in, depth at 750 and 46 ppb, respectively. Applied agricultural research. Winter 1990. v. 5 (1). p. 37-43. ill., maps. Includes references. (NAL Call No.: DNAL S539.5.A77).

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Azinphos-methyl residues in apples and spatial distribution of fluorescein in vase-shaped apple trees.
JPFCD2. Belanger, A. Bostanian, N.J.; Boivin, G.; Boudreau, F. New York, N.Y. : Marcel Dekker. Journal of environmental science and health : Part B : Pesticides, food contaminants, and agricultural wastes. 1991. v. 26 (3). p. 279-291. Includes references. (NAL Call No.: DNAL TD172.J61).

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Bad apples.
Yonkers, N.Y. : The Union. The history of the discovery of UDMH (a breakdown product formed when alar containing products are cooked) as health hazards and attempts to ban alar's use is outlined. The sensitivity of two testing methods (PAM II and Conditt) is briefly discussed. Environmental Protection Agency (EPA) regulations; the reaction of the baby food industry; and the results of Consumer Reports testing of apples and apple juices are presented. The health risk of cancer from UDMH consumption and recommendations are included. Consumer reports - Consumers Union of United States. May 1989. v. 54 (5). p. 288-290, 292. ill., charts. (NAL Call No.: DNAL 321.8 C762).

1426

Chemical control of water sprouts and root suckers of apple and pear.
WUEXA. Tukey, R.B. Raese, J.T. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Jan 1991. (1593). 2 p. (NAL Call No.: DNAL 275.29 W27P).

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A comparison of handgun and tree-row-volume pesticide application.
PLDIDE. Sutton, T.B. Unrath, C.R. St. Paul, Minn. : American Phytopathological Society. Plant disease. June 1988. v. 72 (6). p. 509-512. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Daminozide: a case study of a pesticide controversy.
Campt, D. Washington, D.C. : Office of Public Awareness. EPA Environmental Protection Agency journal. May 1987. v. 13 (4). p. 32-34. ill. (NAL Call No.: DNAL TD171.U5).

1429

Daminozide inhibits ethylene by preventing the conversion of methionine to amino cyclopropane carboxylic acid (ACC).
PPGGD. Salas-Quintana, S. Gianfagna, T. Lake Alfred, Fla. : The Society. Proceedings of the Plant Growth Regulator Society of America. Meeting held August 6-10, 1989, Arlington, Virginia. i989. (i6th). p. 218-222. Includes references. (NAL Call No.: DNAL SB128.P5).

1430

Daminozide residues in apple orchards: concentrations in fruit, trees, and soil.
BECTA6. Mattina, M.J.I. Pylypiw, H.M. Jr.; Paiva, A.A. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Dec i990. v. 45 (6). p. 858-863. Includes references. (NAL Call No.: DNAL RAi270.P35Ai).

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Determination and persistence of several fungicides in postharvest-treated apples during their cold storage.
JAFCAU. Cano, P. Plaza, J.L. de la; Munoz-Delgado, L. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Jan/Feb 1987. v. 35 (i). p. i44-i47. ill. Includes references. (NAL Call No.: DNAL 38i J8223).

1432

Determination of daminozide and dimethylhydrazine residues in Swiss apple juice concentrates using gas chromatography-mass spectrometry.
JAFCAU. Rutschmann, M.A. Buser, H.R. Washington, D.C. : American Chemical Society. Apple juice concentrates analyzed for daminozide and 1,1-dimethylhydrazine (UDMH) by a sensitive gas chromatographic mass spectrometric (GC-MS) method showed with the exception of one sample no detectable concentrations of daminozide. The exceptive sample showed traces of daminozide (0.07 ppm) that could have resulted from the illegal use of daminozide by one fruit grower from more than a hundred. The samples were collected from large-scale storage tanks in different regions in Switzerland and represented a cross section of Swiss production. The samples were analyzed for daminozide after alkaline digestion to UDMH and derivatization to pentafluorobenzoyl derivatives. The exceptive apple juice concentrate was further analyzed directly for UDMH by isolation via cation-exchange chromatography and derivatization. No UDMH was found in this analysis. Comparative analysis showed the GC-MS method to be much less susceptible to interfering compounds than electron capture detection. Other hydrazines were comparatively analyzed and GC and MS properties of the pentafluorobenzoyl derivatives reported. Journal of agricultural and food chemistry. Jan 1991. v. 39 (1). p. 176-18i. Includes references. (NAL Call No.: DNAL 38i J8223).

1433

Determination of fluvalinate metabolite residues in cottonseed, apples, tomatoes, and soil.
JAFCAU. Fitch, W.L. Sjolander, A.C.; Miller, W.W. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. July/Aug i988. v. 36 (4). p. 764-766. Includes references. (NAL Call No.: DNAL 38i J8223).

1434

Determination of several pesticides with a chemical ionization ion trap detector.
JAFCAU. Mattern, G.C. Singer, G.M.; Louis, J.; Robson, M.; Rosen, J.D. Washington, D.C. : American Chemical Society. A total of one hundred (twenty five each) apple, peach, tomato, and potato samples were analyzed for twelve pesticides and two pesticide metabolites with a slightly modified Luke multiresidue extraction procedure, separation by capillary column gas chromatography with cold on-column injection, and detection by mass chromatography with an ion trap mass spectrometer in the chemical ionization mode (GC/CIMS). Residues of carbaryl, captan, dichloran, dimethoate, methamidophos, phosmet, and tetrahydrophthalimide were found in several samples, with peaches containing the most residues. None of the residues found were above legal tolerances. Recovery studies were performed at the 0.5 ppm fortification level of each pesticide and metabolite at least three times in each of the four crops. Recoveries were between 73 and i20%, with an average coefficient of variation of 1i%. Because the computer can be programmed to search for several hundred targeted ions, the use of capillary column GC/CIMS is a promising method that should be explored by regulatory agencies for the analysis of pesticide residues. Journal of agricultural and food chemistry. Feb i990. v. 38 (2). p. 402-407. Includes references. (NAL Call No.: DNAL 381 J8223).

1435

Differential tolerance of woody nursery crop seedlings to napropamide.
WETEE9. Crabtree, S. Crabtree, G. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct/Dec i989. v. 3 (4). p. 584-589. ill. Includes references. (NAL Call No.: DNAL SB610.W39).

1436

Downwind residue from air spraying of a dwarf apple orchard.
TAAEA. Fox, R.D. Brazee, R.D.; Reichard, D.L.; Hall, F.R. St. Joseph, Mich. : American Society of Agricultural Engineers. The edge row of dwarf apple trees was sprayed with an air sprayer; fluorescent dye was used to trace spray drift deposits. Tracer deposited on the ground was measured with plastic collectors and airborne spray was captured and measured with string, bottle, and high-volume, air-sampling filter collectors. Microclimatic variables including vertical heat flux were measured. Ground deposit decreased greatly beyond 120 m; about 0.03% of total material sprayed was deposited between 122 and 152 m downwind. Airborne spray between the ground and a 20 m level at 122 m downwind was estimated to be about 3.5%. Ground collectors and an unobstructed array of string collectors located 5.0 m from the sprayer captured about 75% of the total material sprayed. Transactions of the ASAE. July/Aug 1990. v. 33 (4). p. 1104-1108. ill. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1437

Drift comparisons between aerial and ground orchard application.
JEENAI. MacCollom, G.B. Currier, W.W.; Baumann, G.L. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1986. v. 79 (2). p. 459-464. Includes references. (NAL Call No.: DNAL 421 J822).

1438

Effect of calcium chloride addition on solution pH and on hydrolysis of certain pesticides.
NEMFA. Coli, W.M. Clark, J.M.; Brooks, M. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1985. v. 91. p. 67-72. Includes 3 references. (NAL Call No.: DNAL 81 M384).

1439

Effect of chlorpyrifos 50W on fruit finish and packout of 'Golden Delicious'.
Hogmire, H.W. Crim, V.L.; Annan, R.O. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. July 1988. v. 5 (3). p. 209-214. Includes references. (NAL Call No.: DNAL SB599.J69).

1440

Effect of HOE 39866 during growing season on apple tree growth.
PNWSB. Young, R.S. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1986. v. 40. p. 199-202. Includes references. (NAL Call No.: DNAL 79.9 N814).

1441

EPA: uniroyal agrees to halt U.S. sales of Alar.
Washington, D.C. : Community Nutrition Institute. Abstract: Uniroyal Chemical Company has agreed to halt sales of Alar in the United States. This decision was in reponse to government and consumer concerns to risks of the pesticide on apples. The apple industry response and foreign sales are also discussed. Nutrition week. June 8, 1989. v. 19 (23). p. 6. (NAL Call No.: DNAL TX341.C6).

1442

Factors influencing the uptake of fenarimol and flusilazol by apple leaves.
PHYTAJ. O'Leary, A.L. Jones, A.L. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Nov 1987. v. 77 (11). p. 1564-1568. Includes references. (NAL Call No.: DNAL 464.8 P56).

1443

Fate of insecticide sprays from apple orchards.
NEMFA. Clark, J.M. Marion, J.R.; Tessier, D.M.; Coli, W.M. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1986. v. 92. p. 76-89. Includes 8 references. (NAL Call No.: DNAL 81 M384).

1444

Fate of the fungicide tolylfluanid in the pear cold stored in controlled or non controlled atmosphere.
BECTA6. Rouchaud, J. Gustin, F.; Creemers, P.; Goffings, G.; Herregods, M. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Apr 1991. v. 46 (4). p. 499-506. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

1445

Fine structure of apple leaves treated with the sterol-inhibiting fungicide bitertanol.
HJHSA. Overton, S.V. Moore, L.D.; Miller, O.K. Alexandria, Va. : American Society for Horticultural Science. Ultrastructural observations were made of leaves of apple (Malus domestica Borkh. cv. Red Delicious) 12, 24, and 72 hours following a single foliar application of the sterol-inhibiting fungicide bitertanol. Thylakoids of chloroplasts from treated leaves were swollen and irregular and chloroplasts had lost their integrity within 12 hours after treatment. Occasionally, mitochondria looked washed out, although no other changes in membrane or organelle structures were observed. Within 24 to 72 hours, moreover, thylakoids of chloroplasts from treated leaves returned to a state similar to that of the controls. However, the numbers of starch granules in the chloroplasts of treated leaves appeared to increase throughout the 72 hours and remained somewhat higher than levels in controls. Thus, bitertanol does not appear to have a lasting effect on apple leaves. HortScience. Feb 1991. v. 26 (2). p. 173-175. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

1446

Gas chromatographic determination of flucythrinate synthetic pyrethroid residues in a range of crops.
JAFCAU. Cordon, C. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Nov/Dec 1986. v. 34 (6). p. 953-955. Includes references. (NAL Call No.: DNAL 381 J8223).

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GC/MS and LC/MS determination of 20 pesticides for which dietary oncogenic risk has been estimated.
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Malathion bait sprays for control of apple maggot (Diptera: Tephritidae).
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mixture compared with 39.0 +/- 9.5% in apples treated with malathion alone and 56.3 +/- 15.5% in untreated apples. In 1987, apple maggot injury in apples treated with malathion bait mixture averaged 3.7 +/- 3.2% compared with 45.7 +/- 2.7% in apples treated with malathion alone and 26.7 +/- 22.2% in untreated apples. Laboratory bioassays of residual toxicities of malathion against apple maggot adults at a rate of 1.2 g (AI)/liter indicated efficacy of less than 1 wk and complete ineffectiveness within 12 d after application on apple foliage and fruits. At the higher rate of 2.4 g (AI)/liter, only 17% mortality was noticed 16 d after application. Further laboratory tests indicated total adult mortality within 48 h and negligible rates of oviposition (less than 1 egg per female) in apples treated with malathion at rates of 0.3 and 0.6 g (AI)/liter mixed with 1% Nulure bait. In apples treated with malathion alone, 29 +/- 7.7% mortality occurred and 10 eggs per female were deposited at the end of 48 h for 0.3 (AI)/liter rate, and 21 +/- 7.7% mortality occurred and 16 eggs per female were deposited for 0.6 g (AI)/liter rate. Nulure alone at 1% had no adverse effects on survival and oviposition of apple maggot females. Results of these field and laboratory experiments showed that addition of Nulure bait to malathion increased adult mortality and reduced oviposition in treated apples. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1716-1721. Includes references. (NAL Call No.: DNAL 421 J822).

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JAFCAU. Roitman, J.N. Mahoney, N.E.; Janisiewicz, W.J.; Benson, M. Washington, D.C. : American Chemical Society. A group of chlorinated phenylpyrrole derivatives was isolated from a strain of Pseudomonas cepacia collected from apple leaves during a screening program designed to detect agents for biological control of fruit spoilage fungi. One of these substances, 2,3-dichloro-4-(2-amino-3-chlorophenyl)pyrrole, has not been previously reported. In vitro testing showed that all four of the phenylpyrroles had antifungal activity toward several fruit pathogens. The new phenylpyrrole showed fungal inhibitory effects on Golden Delicious apples inoculated with conidia of pathogenic organisms. An unrelated but known compound, 2-(2-heptenyl)-3-methyl-4(1H)-quinolone, was also isolated. Journal of agricultural and food chemistry. Feb 1990. v. 38 (2). p. 538-541. Includes references. (NAL Call No.: DNAL 381 J8223).

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Derivation of DRIS norms from a high-density apple orchard established in the Quebec Appalachian Mountains.
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Effect of a foliar urea application and mite injury on yield and fruit quality of apple.
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Evaluation of four soil amendments in ameliorating toxic conditions in three orchard subsoils.
AAREEZ. Baugher, T.A. Singh, R.N. New York, N.Y. : Springer. Rock phosphate was compared to agricultural limestone, superphosphate, and lime plus superphosphate for controlling Al and Mn toxicities in orchard soils. Acid soils were selected from orchards where fruit tree growth was unfavorable, and "Delicious" apple (Malus domestica Borkh.) trees were planted in both pot cultures and field plots. Rock phosphate was effectively acidulated in Hagerstown silt loam (pH 5.0-5.5), Berks channery silt loam (pH 3.5-4.0), and Lehew channery fine sandy loam (pH 4.0-4.5). Soil pH was increased, soil and plant levels of Ca, Mg and P were increased and soil and plant levels of Al and Mn were decreased to nontoxic levels. Root and shoot growth were enhanced, and the incidence and severity of internal bark necrosis (IBN) were decreased. Rock phosphate was less effective than lime or lime plus phosphate in increasing pH and decreasing Mn and Al. Exchangeable Al and available Mn in rock phosphate-treated soils were well below the toxic range, however, and levels of essential nutrients were optimal. Eight years following field application of amendments, rock phosphate continued to affect soil Ca and P levels, and some lime plus phosphate treatments persisted in affecting soil pH and soil Mn. Lime or phosphate alone were not persistent. Applied agricultural research. Spring 1989. v. 4 (2). p. 111-117. Includes references. (NAL Call No.: DNAL S539.5.A77).

1506

Experiments in orchard soil management fertilizers, mulches, and cover crops /R.C. Collison.
Collison, R. C. 1884-. Geneva, N.Y. : New York State Agricultural Experiment Station, 1940. Cover title. 37 p. ; 23 cm. (NAL Call No.: DNAL 100 N48 (2) no.691).

1507

Fertigation of apples with nitrate or ammonium nitrogen under drip irrigation. I. Tree performance.
CSOSA2. Klein, I. Spieler, G. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. Mar 1987. v. 18 (3). p. 311-322. Includes references. (NAL Call No.: DNAL S590.C63).

1508

Fertigation of apples with nitrate or ammonium nitrogen under drip irrigation. II. Nutrient distribution in the soil.
CSOSA2. Klein, I. Spieler, G. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. Mar 1987. v. 18 (3). p. 323-339. Includes references. (NAL Call No.: DNAL S590.C63).

1509

Fertilizing fruit in small areas.
Hayden, R.A. West Lafayette, Ind. : The Service. HO - Purdue University, Cooperative Extension Service. Mar 1987. (109,rev.). 2 p. (NAL Call No.: DNAL SB21.I6P8).

1510

Flowering of apple trees in the second year is increased by first-year P fertilization.
HJHSA. Neilsen, G.H. Hogue, E.J.; Parchomchuk, P. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1990. v. 25 (10). p. i247-i250. Includes references. (NAL Call No.: DNAL SBi.H6).

1511

Fluidized bed material applied at disposal levels: effects on an apple orchard.
JEVQAA. Korcak, R.F. Madison, Wis. : American Society of Agronomy. Atmospheric fluidized-bed combustion represents an economical technology for the burning of high S fossil fuel. The combustion residue is a dry, alkaline material resulting from the burning of coal (or other fuel source) and limestone. Although the residue has been assessed as a limestone substitute, the current study examines the potential for disposing of relatively large quantities. Fluidized bed material (FBM) was applied at two rates to the surface area within the rows of an established apple (Malus domestica Borkh.) orchard containing four tree types. The rates were either 9.2 kg/m2 (low rate), 36 kg/m2 (high rate), or untreated control. The tree types used were 'Spuree Rome' on M9, 'Redchief Delicious' on M9 or M9/MM106, and 'Sturdeespur Delicious' on M9. Cumulative yields (kg/tree) were enhanced on three of four tree types over a period of 6 yr. A i5% reduction in yield was noted for Redchief Delicious on M9/MMi06 stocks at the high FBM rate. No nutritional related problems were noted for this or any other of the the tree types used. Part of the yield reduction noted was due to fruit size differences and/or differential sensitivity of this interstock/rootstock combination to the altered soil chemical properties. Generally, amended soil pH increased to about 7.0 for either rate, and electrical conductivity increased five fold at the high rate of FBM addition. Agricultural utilization of large volumes (up to i12 Mg/ha) of FBM, compared to past research whereFBM was used as a lime substitute (2-6 mg/ha), appears to be a feasible alternative. However, rootstock selection for apple may need to consider the resultant changes in soil chemical status from FBM additions. Journal of environmental quality. July/Sept i988. v. i7 (3). p. 469-473. Includes references. (NAL Call No.: DNAL QH540.J6).

1512

Fruit quality, growth, and phosphorus increased with mono-ammonium phosphate fertilization of 'Golden Delicious' apple trees in a low-phosphorus soil.
JPNUDS. Raese, J.T. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. Paper presented at the "Tenth International Plant Nutrition Colloquium," August 4-9, 1986, Beltsville, Maryland. i987. v. 10 (9/i6). p. 2007-2015. Includes references. (NAL Call No.: DNAL QK867.J67).

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Growth of apple seedlings on sludge-amended soils in the greenhouse.
CSOSA2. Korcak, R.F. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. Oct 1986. v. i7 (10). p. 1041-1054. Includes references. (NAL Call No.: DNAL S590.C63).

1514

Improving the growth of newly planted apple trees.
HJHSA. Autio, W.R. Greene, D.W.; Cooley, D.R.; Schupp, J.R. Alexandria, Va. : American Society for Horticultural Science. Increasing the N application rate (in the form NH4NO3) to newly planted 'Marshall McIntosh'/M.9 apple (Malus domestica, Borkh.) trees beyond 76 g N per tree per year reduced growth in the first two growing seasons. Peat moss or composted manure mixed into the planting hole of 'Royal Gala'/M.26 increased growth in the first growing season after planting. The soil-active fungicides, fosetyl-Al and metalaxyl, increased trunk and shoot growth of 'Royal Gala'/M.26 in the first season after planting. Mulching enhanced growth of 'Gala'/M.26 only in the third season after planting, a season during which the region experienced a drought. Mulching significantly increased bloom on 'Gala'/M.26 2 years after planting. The growth of 'Royal Gala'/M.26, 'Marshall McIntosh'/M.26, and 'Ace Delicious'/M.26 was not affected by planting technique: planting by hand in 6i-cm augered holes vs. planting with a mechanical tree planter. Chemical names used: N-(2,6-dimethyl-phenyl)-N-(methloxyacetyl) alanine methyl ester (metalaxyl); aluminum tris (O-ethyl phosphonate) (fosetyl-Al); i,1'-dimethyl-4-4'-bipyridinium ion (paraquat); isopropylamine salt of N-(phosphonomethyl) glycine (glyphosate). HortScience. July 1991. v. 26 (7). p. 840-843. Includes references. (NAL Call No.: DNAL SB1.H6).

1515

Increasing the calcium content of apple fruits to improve storability and attenuate physiological disorders.
ARHMA. Dilley, D.R. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (i20th). p. i95-207. Includes references. (NAL Call No.: DNAL 81 M58).

1516

Influence of calicum and mangnesium salts on acid soil chemistry and calcium nutrition of apple.
SSSJD4. Pavan, M.A. Bingham, F.T.; Peryea, F.J. Madison, Wis. : The Society. Soil Science Society of America journal. Nov/Dec 1987. v. 51 (6). p. 1526-1530. Includes references. (NAL Call No.: DNAL 56.9 S03).

1517

Influence of pruning and urea sprays on growth and fruiting of spur-bound Delicious' apple trees.
JOSHB. Ferree, D.C. Forshey, C.G. Alexandria, Va. : The Society. Spur quality and leaf nutritional levels were determined in various canopy sections of mature spur-bound 'Delicious'-type apple (Malus domestica Borkh.) trees and then various pruning and foliar urea treatments were applied to alter growth and improve fruit size. Fruit size declined from the top to the bottom of the canopy of mature spur-bound 'Starkrimson Delicious' trees with a similar pattern in the following criteria: leaf area/spur, spur specific leaf weight, and spur bud diameter. Spur leaf area was higher in the top center and east sections than in the top south. Spur bud diameter in the bottom third of the canopy was highest in the north and east sections, lowest in the central section, and intermediate in the south and west sections. Concentrations of leaf Mn, Zn, B, Al, and Na tended to increase from the top to the bottom of the canopy. Four urea sprays (6 g urea/liter) during the cell division period of fruit growth had little influence on spur quality, but fruit weight was increased 3 successive years. Spur pruning of 25-year-old 'Starkrimson Delicious' trees was not sufficient to increase shoot growth or improve spur quality, but heading back into 2-year-old wood plus spur pruning increased shoot number by 38%. Spur and heading-back pruning increased the number of shoots and total shoot leaf area of 13-year-old 'Red Chief Delicious' trees, and the combination of both pruning types led to the greatest increase. Heading-back of the younger trees increased leaf area of both shoots and spurs and spur pruning also increased leaf area/spur. Heading-back pruning increased average fruit weight, and the increase was positively correlated with total leaf area, shoot leaf area, and number of shoot leaves/mm of branch circumference. Journal of the American Society for Horticultural Science. Sept 1988. v. 113 (5). p. 699-703. Includes references. (NAL Call No.: DNAL 81 S012).

1518

Influence of soil on fruit production.
NEMFA. Veneman, P.L.M. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 56-60. Includes references. (NAL Call No.: DNAL 81 M384).

1519

Influence of various rates of Ca(NO3)2 fertilizer and soil management on young apple trees.
JOSHB. Miller, S.S. Glenn, D.M. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Mar 1985. v. 110 (2). p. 237-243. ill. Includes 33 references. (NAL Call No.: DNAL 81 S012).

1520

Nutrition and yield of young apple trees irrigated with municipal waste water.
JOSHB. Neilsen, G.H. Stevenson, D.S.; Fitzpatrick, J.J.; Brownlee, C.H. Alexandria, Va. : The Society. 'Macspur McIntosh' and 'Red Chief Delicious' apple (Malus domestica Borkh.) on M.7a rootstock were subjected to treatments involving all combinations of two types of irrigation water (well-water or municipal effluent) from 1983, the year of planting, through 1987 and three rates of N fertilization (0, 200, 400 g NH4NO3/tree per year), from 1984 through 1987. The zero N treatment was increased to 100 g NH4NO3/tree per year in 1986 due to low vigor of these trees. Effluent irrigation increased leaf N, P, and K concentration in 4 of 5 years for 'McIntosh', while leaf N, P, and K increased in 1, 4, and 2 years, respectively, for 'Delicious'. Effluent irrigation increased trunk diameter increment in all years and fruit number and yield in 1985-86 for both cultivars. No major horticultural limitations to the use of effluent irrigation were observed. Nitrogen fertilization increased leaf N in 3 years for 'McIntosh' and 2 years for 'Delicious', while leaf P and K were decreased at the highest N rate in 2 years for each cultivar. Nitrogen fertilization did not increase trunk diameter and increased fruit number and yield only in 1986 after 3 years of a zero N treatment. The results implied a role for P in the establishment and early growth and yield of young apple trees. Journal of the American Society for Horticultural Science. May 1989. v. 114 (3). p. 377-383. Includes references. (NAL Call No.: DNAL 81 S012).

1521

Phosphate-fertilizer-induced salt toxicity of newly planted apple trees.
SSSJD4. Peryea, F.J. Madison, Wis. : The Society. Monoammonium phosphate (MAP) or triple superphosphate (TSP) added to planting holes often stimulates early growth of apple trees (Malus domestica Borkh.); however, high rates may stunt or kill trees. A greenhouse study was conducted on a Quincy sand (a mixed, mesic Xeric Torripsamment) and a Cowiche silt loam (a fine-loamy, mixed, mesic Aridic Argixeroll) to examine effects of soil type, P source (MAP or TSP), and P rate (0-2.75 kg P/m3) on soil salinity, soil acidity, and apple tree growth in nonleaching soil systems during a 56-d period after planting. Rootstock and old scion masses were not affected by soil type or P

treatments. In the Quincy sand, new scion mass and root mass were inversely related to P rate in both MAP- and TSP-amended soil; tree death occurred at P rates above 1.65 kg/m3. In the Cowiche soil, root mass was independent of and new scion mass was inversely related to P rate. At equivalent P rates, TSP produced lower soil salinity and greater soil acidity than MAP. For a given P source, soil salinity and acidity were positively related to P rate. Soil salinity decreased and soil pH increased over time. Relative new scion mass was inversely related to time-integrated soil salinity; however, the relationships were soil-specific. Total exchangeable soil acidity was positively related to P rate and was soil-dependent. Exchangeable soil Al was detected only at the two highest TSP rates in the Quincy soil. Indirect evidence suggested that Mn, NH3, and NO2 phytotoxicities and any nutrient deficiencies were absent. The results suggest that transient soil salinization is the primary mechanism for MAP- and TSP-induced apple tree phytotoxicity. Soil Science Society of America journal. Nov/Dec 1990. v. 54 (6). p. 1778-1783. Includes references. (NAL Call No.: DNAL 56.9 SO3).

1522

Phosphorous nutrition in Washington tree fruit orchards.
PWHAA. Peryea, F.J. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1988. (84th). p. 225-227. Includes references. (NAL Call No.: DNAL 81 W273).

1523

Phosphorus research on tree fruits in British Columbia, Canada.
PWHAA. Neilsen, G.H. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1988. (84th). p. 230-232. (NAL Call No.: DNAL 81 W273).

1524

Rapid production methods for Ottawa-3 rootstock and branched apple nursery stock.
HJHSA. Hogue, E.J. Neilsen, D. Alexandria, Va. : American Society for Horticultural Science. A system for the rapid production of Ottawa-3 (O.3) rootstock (Malus domestica Borkh.) and branched apple nursery stock in the greenhouse is described. The time required for production of a finished tree, approximately 1 year, compared favorably with traditional methods. Cuttings derived from tissue-cultured O.3 rootstocks rooted well (up to 94% success rate), and the rooting effect persisted in cuttings from tissue-cultured rootstocks grown for 1 year in the field. All combinations of two levels of N and P in a Long Ashton nutrient solution were applied weekly to pots containing either tissue-cultured rootstocks or cuttings. The growth rate of tissue-cultured rootstocks exceeded that of cuttings. The growth rate of both sources of rootstocks increased in response to added P and N. Growth of scion shoots ('Royal Gala') increased in response to N. Branch production of 'Royal Gala' was greater for trees with the higher P and N rates. Trees on tissue-cultured rootstocks had more branches than those on cutting-derived rootstocks at the higher level of N. HortScience. Nov 1991. v. 26 (11). p. 1416-1419. Includes references. (NAL Call No.: DNAL SB1.H6).

1525

Recent British Columbia research on zinc nutrition.
PWHAA. Neilson, G.H. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1988. (84th). p. 233-235. (NAL Call No.: DNAL 81 W273).

1526

Renovation of a pear orchard site with sludge compost.
CSOSA2. Korcak, R.F. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. Nov 1986. v. 17 (11). p. 1159-1168. Includes references. (NAL Call No.: DNAL S590.C63).

1527

Response of 'Delicious' apple trees in the greenhouse to rates and forms of nitrogen and phosphorus in a low-phosphorus soil.
HJHSA. Raese, J.T. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1985. v. 20 (2). p. 234-236. Includes 22 references. (NAL Call No.: DNAL SB1.H6).

1528

Seasonal variation in leaf zinc concentration of apples receiving dormant zinc.
HJHSA. Neilsen, G.H. Alexandria, Va. : American Society for Horticultural Science. HortScience. Feb 1988. v. 23 (1). p. 130-132. Includes references. (NAL Call No.: DNAL SB1.H6).

1529

Soil disinfection and monoammonium phosphate fertilization increase precocity of apples on replant problem soils.
JOSHB. Neilsen, G.H. Yorston, J. Alexandria, Va. : The Society. In an apple (Malus domestica Borkh.) orchard with a severe replant problem, tree size was increased by the 2nd year and number of fruit by the 3rd year by treating the planting hole soil with formalin or mancozeb plus monoammonium phosphate (MAP) fertilizer. Growth increases were evident each year for 4

years only for the MAP + formalin treatment. In a second orchard, with a less severe replant problem, planting-hole treatment with formalin or dazomet + MAP increased tree size by year 2. Number of fruit in year 2 was increased by formalin and mancozeb + NM treatments, although this effect persisted in year 3 only for mancozeb + MAP. Leaf P concentrations were increased to high values in the first year by NM fertilization but declined in subsequent years. Leaf Mn concentration also increased in oneorchard, a consequence of fertilizer-induced acidification of planting hole soil and Mn uptake from the fungicide mancozeb. Journal of the American Society for Horticultural Science. July 1991. v. 116 (4). p. 651-654. Includes references. (NAL Call No.: DNAL 81 S012).

1530

Some soil quality factors in relation to replant.
PWHAA. Smith, T.J. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 146-151. ill. (NAL Call No.: DNAL 81 W273).

1531

Tree nitrogen status and leaf canopy position influence postharvest nitrogen accumulation and efflux from pear leaves.
JOSHB. Sanchez, E.E. Righetti, T.L. Alexandria, Va. : The Society. 'Comice' pear trees (Pyrus communis L.) were fertilized with ammonium nitrate depleted in 15N in Spring 1987 and 1988. In Aug., Oct., and Nov. 1988, midleaves on current season shoots were sampled at three positions from the periphery to the center of the canopy. Total N/cm2 of leaf area remained almost constant through October, even though percent N concentration declined as specific leaf weight (SLW) increased. Furthermore, there was no substantial net change in either labeled or unlabeled N in either treatment until senescence began in October. Peripheral leaves contained higher levels of both reserve and newly acquired N than did less-exposed leaves. Despite large differences in N/cm2 for October samples, by November leaves from both high (HN) and low N (LN) trees exported similar percentages of their total N. The average N export to storage tissues irrespective of tree N status was 71%, 61%, and 52% for peripheral, medium, and interior leaves, respectively. The export of N was influenced more by the leaf position in the plant canopy than the nutritional status of the tree. Journal of the American Society for Horticultural Science. Nov 1990. v. 115 (6). p. 934-937. Includes references. (NAL Call No.: DNAL 81 S012).

1532

Apple production without alar.
ARHMA. Hull, J. Jr. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1989. (119). p. 115-119. (NAL Call No.: DNAL 81 M58).

1533

Control of Rosellinia necatrix in soil and in apple orchard by solarization and Trichoderma harzianum.
PLDRA. Sztejnberg, A. Freeman, S.; Chet, I.; Katan, J. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1987. v. 71 (4). p. 365-369. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1534

Diversification of agricultural landscapes--a vital element for pest control in sustainable agriculture.
Altieri, M.A. East Lansing, Mich. : Michigan State University Press, 1985. Sustainable agriculture & integrated farming systems : 1984 conference proceedings / edited by Thomas C. Edens, Cynthia Fridgen, Susan L. Battenfield. p. 166-184. Includes references. (NAL Call No.: DNAL S441.S8).

1535

The effect of orchard floor management on tree growth.
ARHMA. Parker, M. Hull, J. Jr. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1989. (119). p. 80-88. (NAL Call No.: DNAL 81 M58).

1536

Estimated cost of replanting to a high density Fuji apple orchard on full dwarf rootstock in central Washington.
WUEXA. Hinman, H. Peterson, B.; Williams, K.; Maib, K. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Includes statistical data. Aug 1991. (1635). 34 p. Includes references. (NAL Call No.: DNAL 275.29 W27P).

1537

Experiments in orchard soil management fertilizers, mulches, and cover crops /R.C. Collison.
Collison, R. C. 1884-. Geneva, N.Y. : New York State Agricultural Experiment Station, 1940. Cover title. 37 p. ; 23 cm. (NAL Call No.: DNAL 100 N48 (2) no.691).

1538

Growing quality apples without alar.
Williams, K.M. Pullman, Wash. : Washington State University Cooperative Extension. Postharvest pomology newsletter. May 1989. v. 7 (1). p. 14-15. (NAL Call No.: DNAL TP440.P67).

1539

Improving the growth of newly planted apple trees.
HJHSA. Autio, W.R. Greene, D.W.; Cooley, D.R.; Schupp, J.R. Alexandria, Va. : American Society for Horticultural Science. Increasing the N application rate (in the form NH4NO3) to newly planted 'Marshall McIntosh'/M.9 apple (Malus domestica, Borkh.) trees beyond 76 g N per tree per year reduced growth in the first two growing seasons. Peat moss or composted manure mixed into the planting hole of 'Royal Gala'/M.26 increased growth in the first growing season after planting. The soil-active fungicides, fosetyl-Al and metalaxyl, increased trunk and shoot growth of 'Royal Gala'/M.26 in the first season after planting. Mulching enhanced growth of 'Gala'/M.26 only in the third season after planting, a season during which the region experienced a drought. Mulching significantly increased bloom on 'Gala'/M.26 2 years after planting. The growth of 'Royal Gala'/M.26, 'Marshall McIntosh'/M.26, and 'Ace Delicious'/M.26 was not affected by planting technique: planting by hand in 61-cm augered holes vs. planting with a mechanical tree planter. Chemical names used: N-(2,6-dimethyl-phenyl)-N-(methloxyacetyl) alanine methyl ester (metalaxyl); aluminum tris (O-ethyl phosphonate) (fosetyl-Al); 1,1'-dimethyl-4-4'-bipyridinium ion (paraquat); isopropylamine salt of N-(phosphonomethyl) glycine (glyphosate). HortScience. July 1991. v. 26 (7). p. 840-843. Includes references. (NAL Call No.: DNAL SB1.H6).

1540

Irrigation systems and water management considerations.
PWHAA. Ley, T.W. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 151-162. ill. (NAL Call No.: DNAL 81 W273).

1541

The mechanism of regulation of 'Bartlett' pear fruit and vegetative growth by irrigation withholding and regulated deficit irrigation.
JOSHB. Chalmers, D.J. Burge, G.; Jerie, P.H.; Mitchell, P.D. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1986. v. 111 (6). p. 904-907. Includes references. (NAL Call No.: DNAL 81 SO12).

1542

An overview of replant problems.
PWHAA. Stevens, R.G. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 132-142. (NAL Call No.: DNAL 81 W273).

1543

Replanting old orchard soils--a panel.
PWHAA. Tvergyak, P. Stevens, B.; Slykhuis, J.; Smith, T.; Ley, T.; Barritt, B.H. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 131-169. ill. (NAL Call No.: DNAL 81 W273).

1544

Root-lesion nematodes, potassium deficiency, and prior cover crops as factors in apple replant disease.
JOSHB. Merwin, I.A. Stiles, W.C. Alexandria, Va. : The Society. Growth chamber evaluations of soil from an orchard replant site showed severe stunting of 'Northern Spy' apple (Malus domestica Borkh.) seedlings grown in field soil (FS) compared with pasteurized soil (PS) from the same site. The FS : PS seedling dry weight ratio of 0.44 indicated a serious replant problem. Leaf nutrient content was generally higher in PS than FS seedlings. Multiple-regression analysis indicated that leaf K and root-lesion nematode (Pratylenchus penetrans Filipjev) primary inoculum accounted for 75% of the variation in FS seedling dry weight. Apple seedling dry weight in FS was 97% of that in PS following a marigold (Tagetes patula L. cv. Sparky) cover crop, and 75% following oats (Avena sativa L. cv. Saia). Root-lesion nematodes were nearly eliminated from the plots with marigold. Other cover crops and weed-free fallow period were less effective in controlling apple replant disease and/or phytonematodes. Journal of the American Society for Horticultural Science. Sept 1989. v. 114 (5). p. 728-732. Includes references. (NAL Call No.: DNAL 81 S012).

1545

Trends of production, cultivars and planting systems on apples and pears in western Europe.
FVRJA. Winter, F. Welte, M. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 44. (NAL Call No.: DNAL 80 F9464).

1546

The use of initial withholding or irrigation and tree spacing to enhance the effect of regulated deficit irrigation on pear trees.
JOSHB. Mitchell, P.D. Chalmers, D.J.; Jerie, P.H.; Burge, G. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1986. v. 111 (6). p. 858-861. Includes references. (NAL Call No.: DNAL 81 S012).

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Variety, rootstock and orchard system considerations.
PWHAA. Barritt, B.H. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 163-169. (NAL Call No.: DNAL 81 W273).

1548

Yield and fruit quality of apple trees under three high density management systems.
FVRJA. Blizzard, S.H. Singha, S.; Baugher, T.A.; Cayton, B.D. University Park, Pa. : American Pomological Society. Fruit varieties journal. Apr 1988. v. 42 (2). p. 67-72. Includes references. (NAL Call No.: DNAL 80 F9464).

1549

Effect of trap design, trap height, and habitat on the capture of sap beetles (Coleoptera: Nitidulidae) using whole-wheat bread dough.
JEENAI. Peng, C. Williams, R.N. Lanham, Md. : Entomological Society of America. Nine trap designs were compared for capturing sap beetles: Lindgren funnel, Multi-Pher I, Skalbeck, Unitrap, Japanese beetle, liquid, water pan, cone, and McPhail. The Lindgren funnel was most effective for Glischrochilus fasciatus (Olivier) and G. quadrisignatus (Say). The Lindgren funnel, Multi-Pher, Skalbeck, moth, and liquid trap all caught equal numbers of Carpophilus lugubris Murray. The Skalbeck is recommended because of its low cost. G. fasciatus, G. quadrisignatus, and C. lugubris flew to higher traps in apple orchards than in open grassy areas. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1515-1519. Includes references. (NAL Call No.: DNAL 421 J822).

1550

Fall migration, hibernation site selection, and associated winter mortality of plum curculio (Coleoptera: Curculionidae) in a Quebec Apple orchard.
JEENAI. Lafleur, G. Hill, S.B.; Vincent, C. Lanham, Md. : Entomological Society of America. In fall, greater than 5,000 labeled (65Zn) adult plum curculio (PC), Conotrachelus nenuphar (Herbst), were released in two orchards, two woodlots, and 16 microplots in a plowed field. From orchards, most PC migrated toward high tree silhouettes at the edge of woodlots unless they occurred to the north. Most PC (83%) released within woodlots, with no directional differences in tree silhousette, migrated south. Migration was influenced by woodlots, with no directional differences in tree silhouette, migrated south. Migration was influenced by woodlot type and direction. Where woodlots had a thin litter layer, PC remained at the edge or returned to the orchard. In a field choice experiment, hibernating PC were recovered in thick litter (86%) and orchard turf (14%) plots, whereas none were found in gravel and thin litter layer plots. In field conditions, most PC hibernated within the litter layer; very few (less than 1%) penetrated the soil. Survival was related to preferred microhabitat type. Speed of dispersion was highest just after release in early September (3 m per insect per day) and close to zero by mid-October. Females dispersed further than males. A pathogenic fungus and bacterium were isolated from diseased PC. Nontarget organisms contaminated with 65Zn included spiders, slugs, earthworms, and birds. Implications for control and future research are discussed. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1152-1172. maps. Includes references. (NAL Call No.: DNAL 421 J822).

1551

Flatheaded apple tree borer (Coleoptera: Buprestidae) in nursery-grown red maples: phenology of emergence, treatment timing, and response to stressed trees.
Potter, D.A. Timmons, G.M.; Gordon, F.C. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1988. v. 6 (1). p. 18-22. Includes references. (NAL Call No.: DNAL SB1.J66).

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Population cycles of western tent caterpillars: experimental introductions and synchrony of fluctuations.
ECOLA. Myers, J.H. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. June 1990. v. 71 (3). p. 986-995. Includes references. (NAL Call No.: DNAL 410 EC7).

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Population dynamics and diversity of Pseudomonas syrinage on maple and pear trees and associated grasses.
PHYTAJ. Malvick, D.K. Moore, L.W. St. Paul, Minn. : American Phytopathological Society. The number of epiphytic Pseudomonas syringae isolated from maple twigs and leaves between July 1985 and September 1986 was erratic (undetectable to 10(5) cfu/g), whereas the number isolated from pear was more stable and often higher (10(3) to 10(6) cfu/g). P. syringae was isolated consistently (about 10(4)-10(7) cfu/g) from perennial rye, orchard, red fescue, annual rye, and brome grasses growing among trees in the maple nursery and from perennial rye grass in the pear orchard. In greenhouse pathogenicity tests, 87% of the P. syringae isolates from maple trees was pathogenic in maple seedlings, whereas 15% of the isolates from pear trees was pathogenic in young pear trees. Of the isolates tested from grasses, 55% from the maple nursery was pathogenic in maple seedlings, and 29% from grass in the pear orchard was pathogenic in young pear trees. These data indicate that grasses and trees support reservoirs of inoculum of pathogenic P. syringae. Indigenous isolates from a maple nursery were variable relative to pathogenicity and DNA restriction-fragment analysis, indicating that epiphytic populations of P. syringae from the grasses and trees were heterogenous. Phytopathology. Oct 1988. v. 78 (10). p. 1366-1370. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Spring migration, within-orchard dispersal, and apple-tree preference of plum curculio (Coleoptera: Curculionidae) in southern Quebec.
JEENAI. Lafleur, G. Hill, S.B. Lanham, Md. : Entomological Society of America. Labeled (65Zn) adult plum curculio (PC), Conotrachelus nenuphar (Herbst), that migrated to adjacent woodlots in fall 1982 reinfested the orchard in spring 1983. Spring migration is thought to include both a mass migration in a preferred direction (the reverse of fall migration direction) and an exploratory component by which PC seek optimal feeding and oviposition sites. A northwestern tendency was observed among PC migrating in one orchard in spring. PC were most active between 12 May (before tight cluster) and 27 June (June drop), with the highest speed of dispersion (4.4 m per insect per day) at fruit set. After emergence and migration to host trees, PC were found on the ground under apple trees, individually and in groups of up to 14 with equal numbers of each sex. As the growing season progressed, PC moved from outside rows adjacent to woodlots toward the center of the orchard, possibly searching for food, oviposition sites, and trees offering sufficient protection from desiccation. PC were more abundant in the southeastern part of the orchard and on early cultivars of trees with dense foliage. Implications for control and future research are discussed. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1173-1187. Includes references. (NAL Call No.: DNAL 421 J822).

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Susceptibility of selected shade and flowering trees to gypsy moth (Lepidoptera: Lymantriidae).
JEENAI. Peterson, N.C. Smitley, D.R. Lanham, Md. : Entomological Society of America. Twenty-one shade and flowering trees were planted in a cultivated opening surrounded on three sides by gypsy moth-infested forest stands. Three Malus cultivars, Salix babylonica, Acer platanoides 'Royal Red' and 'Crimson Sentry,' and Prunus cerasifera 'Thundercloud' were the most heavily defoliated (30-70%) each year. Acer rubrum 'Northwood' and 'October Glory,' Tilia cordata 'Greenspire,' and Tilia americana suffered low to moderate defoliation (4-20%). Acer platanoides 'Emerald Queen,' Acer saccharinum, Fraxinus pennsylvanica 'Marshall Seedless,' Platanus X acerifolia 'Bloodgood,' Pyrus calleryana 'Redspire,' Acer platanoides 'Deborah,' Prunus serrulata 'Kwanzan,' Gleditsia triacanthos var. imermis 'Sunburst,' and Magnolia X soulangiana lost <4.0% of their foliage because of gypsy moth feeding injury. A wide range of host plant resistance levels among cultivars of A. platanoides and species of Acer and Prunus indicates a need for evaluating cultivars of shade trees susceptible to gypsy moth. In a separate study at the same site, Acer rubrum 'Northwood' planted in the cultivated opening was more heavily defoliated (14.4%) by gypsy moth larvae than similar trees planted in the adjacent forest stand (6.6%). Journal of economic entomology. Apr 1991. v. 84 (2). p. 587-592. Includes references. (NAL Call No.: DNAL 421 J822).

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Use of thematic mapper data for the detection of forest damage caused by the pear thrips.
RSEEA. Vogelmann, J.E. Rock, B.N. New York, N.Y. : Elsevier Science Publishing. Remote sensing of environment. Dec 1989. v. 30 (3). p. 217-225. ill., maps. Includes references. (NAL Call No.: DNAL QI84.R4).

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Variation in ribosomal DNA among biological species of Armillaria, a genus of root-infecting fungi.
EVOLA. Anderson, J.B. Bailey, S.S.; Pukkila, P.J. Lawrence, Kan. : Society for the Study of Evolution. Evolution. Dec 1989. v. 43 (8). p. 1652-1662. ill. Includes references. (NAL Call No.: DNAL 443.8 EV62).

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Glyphosate applications to the bark of nine tree species.
PNWSB. Kuhns, L.J. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6-9, 1992, Boston, Massachusetts. 1992. v. 46. p. 23-26. (NAL Call No.: DNAL 79.9 N814).

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Abundance and identification of the leafmining guild on apple in the Mid-Atlantic States.
GRLEA. Brown, M.W. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Winter 1990. v. 23 (4). p. 179-188. Includes references. (NAL Call No.: DNAL QL461.M5).

1560

Acaricide bioassays with spider mites (Acari: Tetranychidae) on pome fruits: evaluation of methods and selection of discriminating concentrations for resistance monitoring.
JEENAI. Knight, A.L. Beers, E.H.; Hoyt, S.C.; Riedl, H. Lanham, Md. : Entomological Society of America. Leaf disk bioassays with the acaricides avermectin B1, fenbutatin oxide, and hexythiazox were conducted with the mite species Panonychus ulmi(Koch), Tetranychus urticae Koch, and T. mcdanieli McGregor collected from apple andpear orchards in Washington. The effects of length of the bioassay period and inclusion of mite walk-off in mortality used to estimate LC50's with fenbutatin oxide and avermectin B1were examined. Correlations between LC50's after 48 and 72 h were significant with bothchemicals. However, large decreases in LC50's with fenbutatin oxide from 48 to 72 h indicatedthat the longer time allowed a more complete assessment of mite mortality. Comparisonof results from closed double-leaf and open single-leaf bioassays with fenbutatin oxidesuggested that mite walk-off should be included in mortality counts. Significant differences inLC50's were found among mite species for hexythiazox and avermectin B1, but not withfenbutatin oxide. P. ulmi was 20 and 2 times more tolerant to hexythiazox and avermectin B1, respectively, than the two Tetranychus species. Correlations among LC50's for acaricideswithin each species were not significant. In addition, partial correlations for species were not significant with LC50's for fenbutatin oxide and hexythiazox and fenbutatin oxide andavermectin B1. Discriminating concentrations for detection of incipient levels of resistance for hexythiazox were established for each species. Discriminating concentrations also were selectedfor the two Tetranychus species for avermectin B1. Journal of economic entomology. Oct 1990. v. 83 (5). p. 1752-1760. Includes references. (NAL Call No.: DNAL 421 J822).

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Apterona helix (Lepidoptera: Psychidae), a palearctic bagworm moth in North America: new distribution records, seasonal history, and host plants.
PESWA. Wheeler, A.G. Jr. Hoebeke, E.R. Washington, D.C. : The Society. Proceedings of the Entomological Society of Washington. Jan 1988. v. 90 (1). p. 20-27. ill. Includes references. (NAL Call No.: DNAL 420 W27).

1562

Artificial oviposition sphere for Mediterranean fruit flies (Diptera: Tephritidae) in field cages.
JEENAI. McInnis, D.O. Lanham, Md. : Entomological Society of America. Colored, polyethylene plastic balls were modified to serve as oviposition devices for a laboratory strain of the Mediterranean fruit fly, Ceratitis capitata (Wiedemann), in the laboratory and the field. In outdoor field cages, large balls (100 mm diameter) yielded significantly more eggs than small balls (25 mm diameter) for all four colors tested (black, red, yellow, and blue). Blue and yellow balls yielded fewer eggs than black or red balls for small and medium (50 mm diameter) sizes, whereas numbers oviposited in black, red, and yellow spheres were not significantly different for numbers laid in the large size. Twice as many eggs were laid into large balls when guava juice was used as an attractant as compared with water. Large black or red balls with guava juice gave roughly as many eggs as did Golden Delicious' apples, and three times as many eggs as did Red Delicious' apples. Laboratory flies oviposited three times as many eggs into large yellow balls with guava juice as did wild flies reared in fruit. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1382-1385. ill. Includes references. (NAL Call No.: DNAL 421 J822).

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Behavioral interactions among formicid species in the ant mosaic of an organic pear orchard.
PPETA9. Paulson, G.S. Akre, R.D. San Francisco, Calif. : Pacific Coast Entomological Society. The Pan-Pacific entomologist. Oct 1991. v. 67 (4). p. 288-297. Includes references. (NAL Call No.: DNAL 421 P193).

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Effect of three plant species on population densities of Xiphinema americanum and Xiphinema rivesi.
JONEB. Georgi, L.L. Raleigh, N.C. : Society of Nematologists. Journal of nematology. July 1988. v. 20 (3). p. 474-477. Includes references. (NAL Call No.: DNAL QL391.N4J62).

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Effects of experience on oviposition and attraction in Drosophila: comparing apples and oranges.
AMNTA. Hoffmann, A.A. Chicago, Ill. : University of Chicago Press. The American naturalist. July 1985. v. 126 (1). p. 41-51. Includes references. (NAL Call No.: DNAL 470 AM36).

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Experiments on the release of a strain of the predatory mite Metaseiulus occidentalis Nesbitt resistant to organophosphorus preparations in Crimean agrocenoses (Pest of the red apple mite Panonychus ulmi).
Zil'bermints, I.V. Kuznetsov, N.N.; Petrushov, A.Z.; Fadeev, YU.N. New York, Allerton Press. Soviet agriculture sciences. 1978. 1978. (8). p. 18-20. ill. 5 ref. (NAL Call No.: S1.S68).

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Flight period and seasonal development of the apple maggot, Rhagoletis pomonella (Walsh) (Diptera: Tephritidae), in Oregon.
AESAAI. Aliniazee, M.T. Westcott, R.L. College Park, Md. : The Society. Annals of the Entomological Society of America. Nov 1987. v. 80 (6). p. 823-828. Includes references. (NAL Call No.: DNAL 420 EN82).

1568

The geographic pattern of genetic differentiation between host associated populations of Rhagoletis pomonella (Diptera: Tephritidae) in the eastern United States and Canada.
EVOLA. Feder, J.L. Chilcote, C.A.; Bush, G.L. Lawrence, Kan. : Society for the Study of Evolution. Evolution. May 1990. v. 44 (3). p. 570-594. maps. Includes references. (NAL Call No.: DNAL 443.8 EV62).

1569

Head capsule widths as an indicator of the larval instar of codling moth (Lepidoptera: Olethreutidae).
GRLEA. Weitzner, P. Whalon, M.E. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Autumn 1987. v. 20 (3). p. 147-150. Includes references. (NAL Call No.: DNAL QL461.M5).

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Labeling tufted apple bud moth (Lepidoptera: Tortricidae) with rubidium: effect on development, longevity, and fecundity.
AESAAI. Knight, A.L. Hull, L.A.; Rajotte, E.G.; Fleischer, S.J. Lanham, Md. : The Society. Annals of the Entomological Society of America. July 1989. v. 82 (4). p. 481-485. Includes references. (NAL Call No.: DNAL 420 EN82).

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Learning of apple fruit biotypes by apple maggot flies.
JIBEE8. Prokopy, R.J. Papaj, D.R. New York, N.Y. : Plenum Publishing. Journal of insect behavior. Jan 1988. v. 1 (1). p. 67-74. Includes references. (NAL Call No.: DNAL QL496.J68).

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Location and survival of pear psylla eggs on pear budwood.
WSEPA. Horton, D.R. Pullman, Wash. : The Society. Proceedings of the Washington State Entomological Society. Meeting held on April 23 and September 17, 1988, Yakima, Washington. 1988. (50). p. 865-866. (NAL Call No.: DNAL QL461.W3).

1573

Microgeographic genetic variation in the apple maggot Rhagoletis pomonella.
GENTA. McPheron, B.A. Smith, D.C.; Berlocher, S.H. Baltimore, Md. : Genetics Society of America. Abstract: We examined electrophoretic variability at five enzyme lociin the apple maggot fly, Rhagoletis pomonella, on a microgeographic scale. Treating flies from individual hawthron trees as separate populations, we estimated F(st) values from allele frequencies. The results indicate that there is significant allele frequency heterogeneity among fly populations over a small spatial scale at some loci but not at others. This variation among loci in degree of differentiation is itself statistically significant, casting doubt on the role of genetic drift in maintaining the heterogeneity. There is also heterogeneity betweenyears in flies from a given tree. These data provide a baseline with which future work on genetic differentiation among apple maggot populations associated with different species of host plants may be compared. Genetics. June 1988. v. 119 (2). p. 445-451. Includes references. (NAL Call No.: DNAL 442.8 G28).

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Morphological variation in Xiphinema spp. from New York orchards.
JONEB. Georgi, L.L. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Jan 1988. v. 20 (1). p. 47-57. maps. Includes references. (NAL Call No.: DNAL QL391.N4J62).

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Overwintering of Phyllonorycter blancardella (Lepidoptera: Gracillariidae) and its parasites, Pholetesor ornigis and Pholetesor pedias (Hymenoptera: Braconidae) in southwestern Ontario.
EVETEX. Laing, J.E. Heraty, J.M. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1987. v. 16 (5). p. 1157-1162. Includes references. (NAL Call No.: DNAL QL461.E532).

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Parasites associated with lepidopterous leaf miners on apple in northeastern Wisconsin.
JEENAI. Oatman, E.R. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1985. v. 78 (5). p. 1063-1066. Includes references. (NAL Call No.: DNAL 421 J822).

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Parasitoid fauna of two Phyllonorycter spp. (Lepidoptera: Gracillariidae) on wild cherries, and similarity to fauna of apple leafminers.
AESAAI. Maier, C.T. College Park, Md. : The Society. Annals of the Entomological Society of America. May 1988. v. 81 (3). p. 460-466. Includes references. (NAL Call No.: DNAL 420 EN82).

1578

Premating and postmating isolation among populations of Metaseiulus occidentalis (Nesbitt) (Acarina: Phytoseiidae).
HILGA. Hoy, M.A. Cave, F.E. Berkeley, Calif. : California Agricultural Experiment Station. Hilgardia : a journal of agricultural science. Nov 1988. v. 56 (6). p. 1-20. ill. Includes references. (NAL Call No.: DNAL 100 C12H).

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Prior experience influences the fruit residence of male apple maggot flies, Rhagoletis pomonella.
JIBEE8. Prokopy, R.J. Cooley, S.S.; Opp, S.B. New York, N.Y. : Plenum Publishing. Journal of insect behavior. Jan 1989. v. 2 (1). p. 39-48. Includes references. (NAL Call No.: DNAL QL496.J68).

1580

Regional, local and microgeographic allele frequency variation between apple and hawthorn populations of Rhagoletis pomonella in western Michigan.
EVOLA. Feder, J.L. Chilcote, C.A.; Bush, G.L. Lawrence, Kan. : Society for the Study of Evolution. Evolution. May 1990. v. 44 (3). p. 595-608. Includes references. (NAL Call No.: DNAL 443.8 EV62).

1581

Seasonal changes in resightings of marked, wild Rhagoletis pomonella (Diptera: Tephritidae) flies in nature.
FETMA. Opp, S.B. Prokopy, R.J. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Dec 1987. v. 70 (4). p. 449-456. Includes references. (NAL Call No.: DNAL 420 F662).

1582

Seasonality of mating and ovarian development in overwintering Cacopsylla pyricola (Homoptera: Psyllidae).
EVETEX. Krysan, J.L. Higbee, B.S. Lanham, Md. : Entomological Society of America. Pear psylla, Cacopsylla pyricola (Foerster), overwinters as an adult in reproductive diapause that is initiated and maintained by short photoperiod. In autumn, females have immature ovaries and few are mated. Coincident with warm field termperatures in late winter, their ovaries mature and most of them become mated. The mean number of spermatophores per female varied from 5.3 to 16.5 (range, 0-63) among populations from three orchards sampled in the spring. Newly emerged laboratory-reared winterform (diapause) males have active sperm in the testes and seminal vesicles. In autumn, field-collected winterform males have sperm in the siminal vesicles, but the rate of insemination of females is very low if males are held in the laboratory under short photoperiod of 10:14 (L:D). The rate of insemination increases greatly after such males are conditioned at a long photoperiod of 16:8 (L:D) for about 10 d. As winter progresses, there is a decrease in the duration of the conditioning required to permit mating. The ability of males to mate with females appears to be under control of the diapause syndrome. Environmental entomology. June 1990. v. 19 (3). p. 544-550. Includes references. (NAL Call No.: DNAL QL461.E532).

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Seasonality of mating and reproduction in pear psylla.
WSEPA. Krysan, J.L. Higbee, B.S. Pullman, Wash. : The Society. Proceedings of the Washington State Entomological Society. Meeting held on April 23 and September 17, 1988, Yakima, Washington. 1988. (50). p. 866. (NAL Call No.: DNAL QL461.W3).

1584

Use of Osmia lignaria propinqua (Hymenoptera: Megachilidae) as a mobile pollinator of orchard crops.

EVETEX. Torchio, P.F. Lanham, Md. : Entomological Society of America. The development of intensive agricultural practices in areas that include cross-pollinated crops requires the introduction of large numbers of pollinating insects only during short flowering periods. The pollination efficacy of one pollinator, Osmia lignaria propinqua Cresson, would be greatly improved if nesting populations could be successfully transported from crop to crop. Results of a 5-yr study that was focused on this subject are summarized as follows. Two studies involved moving individual nest blocks various distances within orchards, two additional experiments tested the possibility of moving bees nesting in small nest shelters greater distances during active nesting periods, and one study tested transport of bees nesting in large nest shelters constructed on flat-bed trailers. All of the transported bees in the first four experiments abandoned established nests immediately after they were moved, and none of these bees reestablished nesting within the confines of experimental plots. Conversely, > 85% of females nesting in trailer-shelters continued to nest uninterruptedly after these large nest shelters were moved. Two additional Osmia species were also successfully transported when these large trailer-shelters were moved. A short discussion of nest orientation requirements expressed by Osmia is included. Environmental entomology. Apr 1991. v. 20 (2). p. 590-596. Includes references. (NAL Call No.: DNAL QL461.E532).

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Guard against bee kill.
Seaman, A. Kuhn, E.; Riedl, H. Willoughby, Ohio : Meister Publishing Company. American fruit grower. Mar 1985. v. 105 (3). p. 13. ill. (NAL Call No.: DNAL 80 G85).

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Perennial diversionary planting designed to reduce pesticide mortality of honey bees in apple orchards.
ABJOA. Ayers, G.S. Wroblewska, A.; Hoopingarner, R.A. Hamilton, Ill. : Dadant & Sons. American bee journal. Apr 1991. v. 131 (4). p. 241-252. (NAL Call No.: DNAL 424.8 AM3).

1587

Toxicity of fungicides and an acaride to honey bees (Hymenoptera: Apidae) and their effects on bee foraging behavior and pollen viability on blooming apples and pears.
EVETEX. Mayer, D.F. Lunden, J.D. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1986. v. 15 (5). p. 1047-1049. Includes references. (NAL Call No.: DNAL QL461.E532).

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Microgeographic genetic variation in the apple maggot Rhagoletis pomonella.
GENTA. McPheron, B.A. Smith, D.C.; Berlocher, S.H. Baltimore, Md. : Genetics Society of America. Abstract: We examined electrophoretic variability at five enzyme lociin the apple maggot fly, Rhagoletis pomonella, on a microgeographic scale. Treating flies from individual hawthron trees as separate populations, we estimated F(st) values from allele frequencies. The results indicate that there is significant allele frequency heterogeneity among fly populations over a small spatial scale at some loci but not at others. This variation among loci in degree of differentiation is itself statistically significant, casting doubt on the role of genetic drift in maintaining the heterogeneity. There is also heterogeneity betweenyears in flies from a given tree. These data provide a baseline with which future work on genetic differentiation among apple maggot populations associated with different species of host plants may be compared. Genetics. June 1988. v. 119 (2). p. 445-451. Includes references. (NAL Call No.: DNAL 442.8 G28).

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Artificial oviposition sphere for Mediterranean fruit flies (Diptera: Tephritidae) in field cages.
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1592

Seasonal changes in resightings of marked, wild Rhagoletis pomonella (Diptera: Tephritidae) flies in nature.
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Behavioral interactions among formicid species in the ant mosaic of an organic pear orchard.
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Learning of apple fruit biotypes by apple maggot flies.
JIBEE8. Prokopy, R.J. Papaj, D.R. New York, N.Y. : Plenum Publishing. Journal of insect behavior. Jan 1988. v. 1 (1). p. 67-74. Includes references. (NAL Call No.: DNAL QL496.J68).

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Parasites associated with lepidopterous leaf miners on apple in northeastern Wisconsin.
JEENAI. Oatman, E.R. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1985. v. 78 (5). p. 1063-1066. Includes references. (NAL Call No.: DNAL 421 J822).

1599

Parasitoid fauna of two Phyllonorycter spp. (Lepidoptera: Gracillariidae) on wild cherries, and similarity to fauna of apple leafminers.
AESAAI. Maier, C.T. College Park, Md. : The Society. Annals of the Entomological Society of America. May 1988. v. 81 (3). p. 460-466. Includes references. (NAL Call No.: DNAL 420 EN82).

1600

Prior experience influences the fruit residence of male apple maggot flies, Rhagoletis pomonella.
JIBEE8. Prokopy, R.J. Cooley, S.S.; Opp, S.B. New York, N.Y. : Plenum Publishing. Journal of insect behavior. Jan 1989. v. 2 (1). p. 39-48. Includes references. (NAL Call No.: DNAL QL496.J68).

1601

Use of Osmia lignaria propinqua (Hymenoptera: Megachilidae) as a mobile pollinator of orchard crops.
EVETEX. Torchio, P.F. Lanham, Md. : Entomological Society of America. The development of intensive agricultural practices in areas that include cross-pollinated crops requires the introduction of large numbers of pollinating insects only during short flowering periods. The pollination efficacy of one pollinator, Osmia lignaria propinqua Cresson, would be greatly improved if nesting populations could be successfully transported from crop to crop. Results of a 5-yr study that was focused on this subject are summarized as follows. Two studies involved moving individual nest blocks various distances within orchards, two additional experiments tested the possibility of moving bees nesting in small nest shelters greater distances during active nesting periods, and one study tested transport of bees nesting in large nest shelters constructed on flat-bed trailers. All of the transported bees in the first four experiments abandoned established nests immediately after they were moved, and none of these bees reestablished nesting within the confines of experimental plots. Conversely, > 85% of females nesting in trailer-shelters continued to nest uninterruptedly after these large nest shelters were moved. Two additional Osmia species were also successfully transported when these large trailer-shelters were moved. A short discussion of nest orientation requirements expressed by Osmia is included. Environmental entomology. Apr 1991. v. 20 (2). p. 590-596. Includes references. (NAL Call No.: DNAL QL461.E532).

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Head capsule widths as an indicator of the larval instar of codling moth (Lepidoptera: Olethreutidae).
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Efficacy of formulated baits for control of Argentine ant (Hymenoptera: Formicidae).
JEENAI. Knight, R.L. Rust, M.K. Lanham, Md. : Entomological Society of America. We developed a laboratory method to determine the potential efficacy of baits formulated for control of the Argentine ant, Iridomyrmex humilis (Mayr). Possible effects as insect growth regulators were not examined. Of the 10 formulated baits tested, only mirex applied to granulated silkworm pupae had delayed toxicity. Hydramethylnon applied to granulated silkworm pupae also provided excellent kill of workers but did not exhibit delayed toxicity. In field tests, this bait provided faster control than did a chemical barrier of granular diazinon. Journal of economic entomology. Apr 1991. v. 84 (2). p. 510-514. Includes references. (NAL Call No.: DNAL 421 J822).

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Monitoring Pholetesor ornigis (Hymenoptera: Braconidae), a parasite of the spotted tentiform leafminer, Phyllonorycter blancardella (Lepidoptera: Gracillariidae): effect of sticky trap location on size and sex ratio of trap catches.
EVETEX. Trimble, R.M. College Park, Md. : Entomological Society of America. Abstract: The effect of trap location on the number and sex ratio of adult Pholetesor (=Apanteles) ornigis (Weed) caught on yellow sticky traps was examined in Ontario from 1982 to 1985 during the spring and first-summer activity periods in one experimental and five commercial apple orchards. In the first experiment, traps placed within the tree canopy in the peripheral zone caught significantly more P. ornigis than traps placed above, within, and below the tree canopy, as well as those placed between adjacent trees in the peripheral and interior zones of the orchard. Traps placed above the tree in both zones caught less than 1% of all parasites trapped. In the second experiment, traps placed within the tree canopy in the interior zone caught significantly more male, female, and total P. ornigis than traps placed below the tree in the interior zone and within and below the tree in the peripheral zone during both the spring and first summer activity periods. The results suggest that the spatial distribution of male and female parasites changes between the spring and first-summer activity periods. Trap location did not significantly affect the sex ratio of trap catches; males constituted from 82.3 +/- 13.6 to 87.2 +/- 7.7% (-/x +/-SD) of the catch. The percentage of males in trap catches from an orchard ranged from 75.6 to 96.4 during the two activity periods, whereas estimates of the percentage of males in the adult population from an orchard ranged from 4.0 to 63.0. Environmental entomology. June 1988. v. 17 (3). p. 567-571. Includes references. (NAL Call No.: DNAL QL461.E532).

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ARHMA. Marshall, D.E. Brown, G.K.; Wolthuis, R.J. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 181-184. Includes references. (NAL Call No.: DNAL 81 M58).

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Mechanical harvestability of Y-shaped and pyramid-shaped 'Empire' and 'Delicious' apple trees.
JOSHB. Robinson, T.L. Millier, W.F.; Throop, J.A.; Carpenter, S.G.; Lakso, A.N. Alexandria, Va. : The Society. Mature 'Empire' and 'Redchief Delicious' apple trees (Malus domestica Borkh.) trained to a Y-shaped trellis (Y/M.26) or trained as pyramid-shaped central leaders (CL/M.7) were mechanically harvested with the Cornell trunk recoil-impact shaker during 4 years. With 'Empire', fruit removal from the Y/M.26 trees (85% to 90%) was significantly less than from the CL/M.7 trees (95% to 97%). With 'Delicious' there were no differences in fruit removal (90% to 95%) between the two tree forms in any year. When the catching pad was on the ground, fruit grade based on damage was only slightly better for the Y/M.26 trees than for the CL/M.7 trees. When the catching pad was raised up near the Y/M.26 canopy, fruit grade was significantly improved for the Y/M.26 trees and was better than the CL/M.7 trees. Fruit grade for both cultivars ranged from 83% to 94% Extra Fancy with 5% to 16% culls for the Y/M.26 trees and from 74% to 88% Extra Fancy and 11% to 21% culls for the CL/M.7 trees. Skin punctures, skin breaks, and number of large and small bruises were lower and the percentage of nondamaged fruit was higher with the Y/M.26 trees when the pads were close to the canopy than when the pads were on the ground. The CL/M.7 trees had higher levels of all types of fruit damage than did the Y/M.26 trees. Damaged fruit from the CL/M.7 trees was mainly from the top half of the tree, while fruit from lower-tier scaffold branches had low levels of damage. Mechanically harvested fruit from the Y/M.26 trees had lower incidences of fruit rot and flesh breakdown after a 6-month storage period than did fruit from the CL/M.7 trees. Stem pulling was high with both systems and averaged 60% for 'Delicious' and 30% for 'Empire'. The advantage of the single plane Y-trellis system for mechanical harvesting appears to be that the catching pads can be placed close to the fruit, thereby reducing fruit damage. Journal of the American Society for Horticultural Science. May 1990. v. 115 (3). p. 368-374. Includes references. (NAL Call No.: DNAL 81 SO12).

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Fertigation of apples with nitrate or ammonium nitrogen under drip irrigation. II. Nutrient distribution in the soil.
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HJHSA. Perry, K.B. Alexandria, Va. : American Society for Horticultural Science. HortScience. Aug 1986. v. 21 (4). p. 1060-1061. Includes references. (NAL Call No.: DNAL SB1.H6).

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Nutrition and yield of young apple trees irrigated with municipal waste water.
JOSHB. Neilsen, G.H. Stevenson, D.S.; Fitzpatrick, J.J.; Brownlee, C.H. Alexandria, Va. : The Society. 'Macspur McIntosh' and 'Red Chief Delicious' apple (Malus domestica Borkh.) on M.7a rootstock were subjected to treatments involving all combinations of two types of irrigation water (well-water or municipal effluent) from 1983, the year of planting, through 1987 and three rates of N fertilization (0, 200, 400 g NH4NO3/tree per year), from 1984 through 1987. The zero N treatment was increased to 100 g NH4NO3/tree per year in 1986 due to low vigor of these trees. Effluent irrigation increased leaf N, P, and K concentration in 4 of 5 years for 'McIntosh', while leaf N, P, and K increased in 1, 4, and 2 years, respectively, for 'Delicious'. Effluent irrigation increased trunk diameter increment in all years and fruit number and yield in 1985-86 for both cultivars. No major horticultural limitations to the use of effluent irrigation were observed. Nitrogen fertilization increased leaf N in 3 years for 'McIntosh' and 2 years for 'Delicious', while leaf P and K were decreased at the highest N rate in 2 years for each cultivar. Nitrogen fertilization did not increase trunk diameter and increased fruit number and yield only in 1986 after 3 years of a zero N treatment. The results implied a role for P in the establishment and early growth and yield of young apple trees. Journal of the American Society for Horticultural Science. May 1989. v. 114 (3). p. 377-383. Includes references. (NAL Call No.: DNAL 81 SO12).

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Responses of 'Bartlett' pear to withholding irrigation, regulated deficit irrigation, and tree spacing.
JOSHB. Mitchell, P.D. van de Ende, B.; Jerie, P.H.; Chalmers, D.J. Alexandria, Va. : The Society. Fruit yield was increased, summer pruning decreased, and water saved when regulated deficit irrigation (RDI) and withholding irrigation (WI) were used over 5 years to manage mature 'Bartlett' pear (Pyrus communis L.) trees planted at three levels of within-row spacing (0.5, 0.75, and 1.0 m) and trained to a Tatura trellis. Three levels of irrigation, 23%, 46%, and 92% replacement of evaporation from the planting square (Eps), were compared during the RDI period. Weight of summer prunings was positively and linearly related to level of irrigation in each year, including a relatively wet year. When compared between years, the degree of this response on the dried treatment was positively and significantly related to net evaporation (evaporation--rainfall) recorded during the period of rapid shoot growth. Fruit number also tended to be greater on the 23% and 46% Eps treatments in all years. Cumulative yield over 10 years of cropping did not differ between tree spacing, although fruit size was larger a the 1-m spacing. High yields were obtained at all levels of tree spacing. Yield and tree growth responded most to RDI for the 0.5-m-spaced trees. Journal of the American Society for Horticultural Science. Jan 1989. v. 114 (1). p. 15-19. Includes references. (NAL Call No.: DNAL 81 SO12).

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Root-lesion nematodes, potassium deficiency, and prior cover crops as factors in apple replant disease.
JOSHB. Merwin, I.A. Stiles, W.C. Alexandria, Va. : The Society. Growth chamber evaluations of soil from an orchard replant site showed severe stunting of 'Northern Spy' apple (Malus domestica Borkh.) seedlings grown in field soil (FS) compared with pasteurized soil (PS) from the same site. The FS : PS seedling dry weight ratio of 0.44 indicated a serious replant problem. Leaf nutrient content was generally higher in PS than FS seedlings. Multiple-regression analysis indicated that leaf K and root-lesion nematode (Pratylenchus penetrans Filipjev) primary inoculum accounted for 75% of the variation in FS seedling dry

weight. Apple seedling dry weight in FS was 97% of that in PS following a marigold (Tagetes patula L. cv. Sparky) cover crop, and 75% following oats (Avena sativa L. cv. Saia). Root-lesion nematodes were nearly eliminated from the plots with marigold. Other cover crops and weed-free fallow period were less effective in controlling apple replant disease and/or phytonematodes. Journal of the American Society for Horticultural Science. Sept 1989. v. 114 (5). p. 728-732. Includes references. (NAL Call No.: DNAL 81 SO12).

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ARHMA. Miller, J.L. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1986. (116th). p. 87-88. (NAL Call No.: DNAL 81 M58).

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Controlled-atmosphere cold storage as a quarantine treatment for nondiapausing codling moth (Lepidoptera: Tortricidae) larvae in apple.
JEENAI. Toba, H.H. Moffitt, H.R. Lanham, Md. : Entomological Society of America. Nondiapausing larvae of Cydia pomonella (L.) in immature apples were held in commercial controlled-atmosphere cold storage at 0 +/- 0.28 degrees C, 95-100% RH, and atmospheric components of 1.5-2.0% O2, <1% CO2, with the remainder being mainly N2. Based on adult emergence, survival decreased from 73% at 0 wk to 0% after a 13-wk exposure. A large-scale test of infested apples held in controlled-atmosphere cold storage for 13 wk resulted in no adult emergence from an estimated 142,021 immature larvae, including an estimated 40,389 fifth instars, the most tolerant stage. No live larvae or pupae were found when infested apples were sampled after treatment. Because codling moth eggs are also susceptible to low temperatures, controlled-atmosphere cold storage for a minimum of 13 wk is a potential quarantine treatment for codling moth eggs and larvae in apples. Journal of economic entomology. Aug 1991. v. 84 (4). p. 1316-1319. Includes references. (NAL Call No.: DNAL 421 J822).

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Sargent, S.A. Brown, G.K.; Burton, C.L.; Pason, N.L.S.; Timm, E.J.; Marshall, D.E. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-6517). 11 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

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Jenni, J. Washington, D.C. : The Service. Horticultural products review FHORT - U.S. Department of Agriculture, Foreign Agricultural Service. Includes statistical data. Feb 1990. (2-90). p. 20-38. (NAL Call No.: DNAL aSB319.4.F6).

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Gyawu, D. Washington, D.C. : The Service. Foreign agriculture - United States Department of Agriculture, Foreign Agricultural Service. June 1986. v. 24 (6). p. 9-11. ill. (NAL Call

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Bitting, H. Wayne 1911-. Badger, Henry T._1923-. Washington, D.C. : U.S. Dept. of Agriculture, Bureau of Agricultural Economics, 1951. Cover title. 27 p. : ill., charts ; 26 cm. Includes bibliographical references. (NAL Call No.: DNAL 1 Ag84Ab no.47).

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PWHAA. Hull, D. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 189-192. (NAL Call No.: DNAL 81 W273).

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GARRA. Hubbard, E.E. Purcell, J.C. Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Experiment Stations. Includes statistical data. Dec 1985. (488). 12 p. maps. Includes 6 references. (NAL Call No.: DNAL S51.E22).

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PWHAA. Hale, T. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1989. (85th). p. 104-106. (NAL Call No.: DNAL 81 W273).

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WUEXA. Hinman, H.R. Hunter, R.E.; Tukey, R.B. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Aug 1985. (i159, rev.). 17 p. (NAL Call No.: DNAL 275.29 W27P).

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Bitter pit control by sprays and vacuum infiltration of calcium in 'Cox's Orange Pippin' apples.
HJHSA. Hewett, E.W. Watkins, C.B. Alexandria, Va. : American Society for Horticultural Science. The incidence of external and internal bitter pit in 'Cox's Orange Pippin' apple (Malus domestica Borkh.) fruit sprayed with normal therapeutic sprays either with or without Ca salts at 2-week intervals during the growing season was determined after 6 weeks of storage over 7 consecutive years. Following harvest, fruit was either vacuum-infiltrated with CaCl2, or received no further treatment. Although there was a tendency for fruit that had been sprayed and vacuum-infiltrated with Ca to exhibit the greatest degree of bitter pit control, this treatment was not significantly superior to Ca sprays alone. Vacuum infiltration alone reduced the disorder to a lesser extent than Ca sprays and was more effective in reducing external than internal bitter bit. The results suggest that Ca applications over the growing season are superior to postharvest vacuum-infiltration with Ca in the prevention of bitter pit. HortScience. Mar 1991. v. 26 (3). p. 284-286. Includes references. (NAL Call No.: DNAL SB1.H6).

1661

Daminozide, root pruning, trunk scoring, and trunk ringing effects on fruit ripening and storage behavior of 'McIntosh' apple.
JOSHB. Elfving, D.C. Lougheed, E.C.; Cline, R.A. Alexandria, Va. : The Society. A midsummer foliar daminozide (DZ) application (750 mg a.i./liter) to 'Macspur McIntosh'/M.7 apple trees (Malus domestica Borkh.) reduced preharvest drop and retarded flesh firmness loss and starch hydrolysis when tested at harvest; DZ also reduced fruit ethylene production at harvest and after 19 weeks of storage at 0.5C. Root pruning at full bloom (May) resulted in increased soluble solids concentration (SSC) and firmer flesh and less starch hydrolysis at harvest, but not consistently each year. Full-bloom root pruning reduced the incidence of stem-cavity browning and brown core, but again not each year. Full-bloom root pruning did not influence ethylene evolution at harvest but did reduce post-storage ethylene evolution in two of three seasons. Full-bloom root pruning generally was less effective than DZ in altering fruit behavior, while root pruning later than full bloom had virtually no effect. Trunk scoring or ringing increased SSC and retarded loss of flesh firmness before harvest and following storage, but had little effect on starch hydrolysis. Scoring or ringing decreased incidence of some disorders and reduced post-storage ethylene evolution, although these treatments had little effect on ethylene production at harvest. Trunk scoring influenced some fruit characteristics more strongly than DZ. Fruit size was not affected by any treatment in any year. Journal of the American Society for Horticultural Science. Mar 1991. v. 116 (2). p. 195-200. Includes references. (NAL Call No.: DNAL 81 SO12).

1662

Determination and persistence of several fungicides in postharvest-treated apples during their cold storage.
JAFCAU. Cano, P. Plaza, J.L. de la; Munoz-Delgado, L. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Jan/Feb 1987. v. 35 (1). p. 144-147. ill. Includes references. (NAL Call No.: DNAL 381 J8223).

1663

Development of oxygen concentration gradients in flesh tissues of bulky plant organs.
JOSHB. Rajapakse, N.C. Banks, N.H.; Hewett, E.W.; Cleland, D.J. Alexandria, Va. : The Society. Steady-state oxygen diffusion in flesh of apples (Malus domestica Borkh. cvs. Braeburn and Cox's Orange Pippin), Asian pears (Pyrus serotina Rehder. cvs. Hosui and Kosui), and nectarines Prunus persica (L.) Batsch. cvs. Red Gold and Sunglo was studied using a nondestructive method at 20C. Fruit flesh was found to exert a significant resistance to O2 diffusion resulting in measurable O2 gradients between tissues immediately beneath the skin and those at the fruit center for all these fruits. The magnitude of these O2 gradients varied between crops and cultivars and depended on the respiration rate and on effective O2 diffusivity in fruit flesh (Dc). Values of Dc varied with the cultivar and were broadly consistent with intercellular space volume. The range of Dc values obtained suggested that O2 diffusion in fruit flesh takes place in a combination of series and parallel modes in the intercellular space and fluid/solid matrix of the flesh. The results imply that O2 diffusivity in flesh tissues must be taken into

consideration in the determination of critical external O2 level in controlled/modified atmosphere (CA/MA) storage. Journal of the American Society for Horticultural Science. Sept 1990. v. 115 (5). p. 793-797. ill. Includes references. (NAL Call No.: DNAL 81 SO12).

1664

The effect of impact bruising on apples and subsequent decay development.
Burton, C.L. Pason, N.L.S.; Brown, G.K.; Timm, E.J. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-6516). 15 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

1665

Effect of paclobutrazol and analogs on growth, yield, fruit quality, and storage potential of 'Delicious' apples.
JOSHB. Greene, D.W. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. May 1986. v. 111 (3). p. 328-332. Includes references. (NAL Call No.: DNAL 81 SO12).

1666

Effects of daminozide and paclobutrazol treatments on fruit ripening and storage behavior of 'McIntosh' apple.
JOSHB. Elfving, D.C. Chu, C.L.; Lougheed, E.C.; Cline, R.A. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1987. v. 112 (6). p. 910-915. Includes references. (NAL Call No.: DNAL 81 SO12).

1667

Effects of daminozide, paclobutrazol, and uniconazole treatments on 'McIntosh' apples at harvest and following storage.
JOSHB. Elfving, D.C. Lougheed, E.C.; Chu, C.L.; Cline, R.A. Alexandria, Va. : The Society. Foliar daminozide (DZ) applications to 'McIntosh' apple trees (Malus domestica Borkh.) increased fruit color, reduced preharvest drop, resulted in greater firmness at harvest and after air storage, delayed starch hydrolysis, and reduced fruit ethylene production at harvest and after storage. Foliar paclobutrazol (PBZ) reduced preharvest drop and flesh firmness loss if applied within 5 weeks after full bloom (WAFB). Later applications had no effect. PBZ did not influence the progress of starch hydrolysis or ethylene production at harvest but reduced poststorage ethylene production in one season. Stem-cavity browning and brown core were increased by PBZ applied at 5 and 9 WAFB in 1987. In 1988, fruit soluble solids content (SSC) was reduced by a double application of PBZ and by uniconazole (UCZ). UCZ had little effect on 'McIntosh' fruit other than the reduction in SSC. PBZ applications were less consistent in their effects than DZ. Journal of the American Society for Horticultural Science. Sept 1990. v. 115 (5). p. 750-756. Includes references. (NAL Call No.: DNAL 81 SO12).

1668

Effects of heat treatments on populations of four fruit decay fungi in sodium ortho phenylphenate solutions.
PLDIDE. Spotts, R.A. Cervantes, L.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1985. v. 69 (7). p. 574-576. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1669

The effects of postharvest infiltration of calcium, magnesium, or strontium on decay, firmness, respiration, and ethylene production in apples.
JOSHB. Conway, W.S. Sams, C.E. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Mar 1987. v. 112 (3). p. 300-303. Includes references. (NAL Call No.: DNAL 81 SO12).

1670

Effects of sequential low-oxygen and standard controlled atmosphere storage regimens on apple quality.
JOSHB. Lidster, P.D. Lougheed, E.C.; McRae, K.B. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Sept 1987. v. 112 (5). p. 787-793. Includes references. (NAL Call No.: DNAL 81 SO12).

1671

Effects of tufted apple budmoth (Lepidoptera: Tortricidae) injury on quality and storageability of processing apples.
JEENAI. Hull, L.A. Rajotte, E.G. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1721-1736. Includes references. (NAL Call No.: DNAL 421 J822).

1672

Evaluation of benzyladenine as a chemical thinner on 'McIntosh' apples.
JOSHB. Greene, D.W. Autio, W.R. Alexandria, Va. : The Society. Five chemical thinning trials, conducted over 4 years, indicated that BA is an effective thinner for 'McIntosh' apples (Malus domestica Borkh.). Although it can thin at concentrations as low as 25 mg.liter-1, in most years a higher concentration was required to thin adequately. It appeared that 14 to 18 days after full bloom, when fruit size was about 10 mm, may be the period when maximum thinning was achieved. Greater thinning occurred when BA and carbaryl were combined than when they were used individually. BA increased fruit weight, flesh firmness, and soluble solids content at harvest relative to no thinning. The storage life of fruit treated with BA was less than that of fruit from nonthinned trees, but this effect may have been an indirect response related to the larger fruit size rather than a direct response to the chemical. BA caused thinning and induced lateral branching simultaneously on young 'Macspur McIntosh' trees. Therefore, crop load on trees just coming into production may be significantly reduced when BA is used to induce lateral branching. Chemical names used: N-(phenylmethyl)-IH-purine-6-amine benzyladenine (BA), 1-napthaleneacetic acid NAA , 1-napthalenyl methylcarbamate carbaryl . Journal of the American Society for Horticultural Science. Jan 1989. v. 114 (1). p. 68-73. Includes references. (NAL Call No.: DNAL 81 SO12).

1673

Evaluation of ripening and fruit quality of 'Gala' and 'McIntosh' apples at harvest and following air storage.
FVRJA. Greene, D.W. Autio, W.R. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1990. v. 44 (3). p. 117-123. Includes references. (NAL Call No.: DNAL 80 F9464).

1674

Factors affecting the progressive development of low-oxygen injury in apples.
Lidster, P.D. Blanpied, G.D.; Lougheed, E.C. Raleigh, N.C. : Department of Horticultural Science, North Carolina State University, 1985 . Controlled atmospheres for storages and transport of perishable agricultural commodities : papers presented at the Fourth Natl Controlled Atmosphere Res Conf, July 23-26, 1985, Raleigh, NC / edited by S.M. Blankenship. p. 57-69. Includes references. (NAL Call No.: DNAL SB319.77.N38 1985).

1675

Fate of the fungicide tolylfluanid in the pear cold stored in controlled or non controlled atmosphere.
BECTA6. Rouchaud, J. Gustin, F.; Creemers, P.; Goffings, G.; Herregods, M. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Apr 1991. v. 46 (4). p. 499-506. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

1676

The influence of calcium on senescence changes and physiological disorders in apples.
NEMFA. Bramlage, W.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 80-85. (NAL Call No.: DNAL 81 M384).

1677

Influence of fruit maturity and growing district on brown-core disorder in 'Bosc' pears.
HJHSA. Chen, P.M. Borgic, D.M.; Sugar, D.; Mellenthin, W.M. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1986. v. 21 (5). p. 1172-1173. Includes references. (NAL Call No.: DNAL SB1.H6).

1678

Influence of maturity, storage procedure, temperature, and oxygen concentration on quality and disorders of 'McIntosh' apples.
JOSHB. Lau, O.L. Yastremski, R.; Meheriuk, M. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Jan 1987. v. 112 (1). p. 93-99. ill. Includes 18 references. (NAL Call No.: DNAL 81 SO12).

1679

Inhibition of softening by polyamine application in 'Golden Delicious' and 'McIntosh' apples.
JOSHB. Kramer, G.F. Wang, C.Y.; Conway, W.S. Alexandria, Va. : The Society. Pressure infiltration of 'Golden Delicious' and 'McIntosh 'apples (Malus domestica Borkh.) with polyamines resulted in an immediate increase in firmness. 'Golden Delicious' apples were 2.7 N (0.25 mm spermidine) to 6.7 N (1.0 mm spermine) firmer, while 'McIntosh' apples were 2.2 N (0.25 mm spermidine) to 5.3 N (1.0 mm spermine) firmer than the water-treated control. During 28 weeks of storage at 0C, the differences between the polyamine-treated and water-treated apples were even larger. Similar results were observed with a 3% Ca treatment, but the Ca treatment reduced the rate of softening to a greater extent than did the polyamine treatments in 'Golden Delicious'. Polyamines

increased the endogenous levels of the polyamines infiltrated; however, the levels declined rapidly with time in storage. Both polyamine and Ca inhibited the development of chilling injury symptoms (brown core) in 'McIntosh'. The influence of polyamines on ethylene production was negligible in both cultivars. The Ca treatment, however, inhibited ethylene evolution in 'Golden Delicious'. Polyamines, thus, may affect apple softening through rigidification of cell walls rather than through interactions with ethylene metabolism. Journal of the American Society for Horticultural Science. Sept 1991. v. 116 (5). p. 813-817. Includes references. (NAL Call No.: DNAL 81 S012).

1680

Integrated management of postharvest diseases.
NEMFA. Rosenberger, D.A. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held on February 1-2, 1989, Sturbridge, Massachusetts. Feb 1989. v. 95. p. 106-112. Includes references. (NAL Call No.: DNAL 81 M384).

1681

Integrated management of postharvest diseases and disorders of apples, pears and cherries.
Willett, M. Kupferman, G.; Roberts, R.; Spotts, R.; Sugar, D.; Apel, G.; Ewart, H.W.; Bryant, B. Pullman, Wash. : Washington State University Cooperative Extension. Postharvest pomology newsletter. Dec 1989. v. 7 (3). 16 p. (NAL Call No.: DNAL TP440.P67).

1682

'McIntosh' apples do not benefit from low-ethylene controlled-atmosphere storage.
HJHSA. Lau, O.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1989. v. 24 (5). p. 801-803. Includes references. (NAL Call No.: DNAL SB1.H6).

1683

Physiology and prediction of fruit tolerance to low-oxygen atmospheres.
JOSHB. Ke, D. Rodriguez-Sinobas, L.; Kader, A.A. Alexandria, Va. : The Society. Fruits of 'Granny Smith' and 'Yellow Newtown' apples (Malus domestica Borkh), '20th Century' pear (Pyrus serotina L.), and 'Angeleno' plum (Prunus domestica L.) were kept in air and in 0.25% or 0.02% O2, at 0, 5, or 10C for 3, 7, 14, 25, or 35 days to study the effects of low-O2, atmospheres on their postharvest physiology and quality attributes. Soluble solids content (SSC), pH, and external appearance were not significantly influenced, but resistance to CO2, diffusion was increased by the low-O2 treatments. Exposures to the low-O2 atmospheres inhibited ripening, including reduction in ethylene production rate, retardation of skin color changes and flesh softening, and maintenance of titratable acidity. The most important detrimental effect of the low-O2, treatments was development of an alcoholic off-flavor that had a logarithmic relation with ethanol content of the fruits. The ethanol content causing slight off-flavor (EO) increased with SSC of the commodity at the ripe stage, and it could be estimated using the following formula: (Log EO)/SSC = 0.228. Using SSC of ripe fruits and average ethanol accumulation rate per day (VE) from each low-O2 treatment, the tolerance limit (T1) of fruits to low-O2, atmospheres could be predicted as follows: T1 = EO/VE = (10(0.228 SSC))/VE. Journal of the American Society for Horticultural Science. Mar 1991. v. 116 (2). p. 253-260. Includes references. (NAL Call No.: DNAL 81 S012).

1684

Postharvest calcium treatments: potential benefits and risks.
NEMFA. Bramlage, W.J. Weis, S.A. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1986. v. 92. p. 106-109. Includes 5 references. (NAL Call No.: DNAL 81 M384).

1685

Postharvest control of blue mold and gray mold of apples and pears by dip treatment with pyrrolnitrin, a metabolite of Pseudomonas cepacia.
PLDIDE. Janisiewicz, W. Yourman, L.; Roitman, J.; Mahoney, N. St. Paul, Minn. : American Phytopathological Society. Plant disease. May 1991. v. 75 (5). p. 490-494. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1686

Postharvest responses of 'Spartan' apples to preharvest paclobutrazol treatment.
HJHSA. Wang, C.Y. Steffens, G.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1987. v. 22 (2). p. 276-278. Includes references. (NAL Call No.: DNAL SB1.H6).

1687

Preharvest and postharvest handling of apples for long storage potential.
NEMFA. Bramlage, W.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 86-91. (NAL Call No.: DNAL 81 M384).

1688

Principles of gas exchange in bulky plant tissues.
HJHSA. Solomos, T. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Factors that Influence Commodity Response to Controlled Atmosphere Storage of the XXII International Horticultural Congress/83rd ASHS Annual Meeting," August 14, 1986, Davis, California. Oct 1987. v. 22 (5). p. 766-771. Includes references. (NAL Call No.: DNAL SB1.H6).

1689

Quality and storage of 'Granny Smith' and 'Greenspur' apples on seedling, M.26, and MM.111 rootstocks.
JOSHB. Drake, S.R. Larsen, F.E.; Higgins, S.S. Alexandria, Va. : The Society. Influences of rootstocks on the quality of 'Granny Smith' and 'Greenspur' apples (Malus domestica Borkh.; were evaluated over an extended harvest period and after cold storage. Apples from trees on M.26 rootstock had the higher firmness, soluble solids concentration (SSC), and Ca content, but poorer external color (red blush) and a higher percentage of solar injury than fruit from trees on seedling or MM.111 rootstocks. External greenness was best on apples from MM.111 rootstock. 'Granny Smith' apples had higher firmness, soluble solids, acids, and carbohydrate contents, and less scald but poorer external greenness than 'Greenspur' apples. 'Granny Smith' or 'Greenspur' apples from M.26 rootstock appeared to mature earlier than those on MM.111. Journal of the American Society for Horticultural Science. Mar 1991. v. 116 (2). p. 261-264. Includes references. (NAL Call No.: DNAL 81 SO12).

1690

Quality of apple fruit from a high density orchard as influenced by rootstocks, fertilizers, maturity, and storage.
JOSHB. Fallahi, E. Richardson, D.G.; Westwood, M.N. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. 1985. v. 110 (1). p. 71-74. Includes references. (NAL Call No.: DNAL 81 SO12).

1691

Reduced rates and multiple sprays of paclobutrazol control growth and improve fruit quality of 'Delicious' apples.
JOSHB. Greene, D.W. Alexandria, Va. : The Society. 'Gardiner Delicious'/MM.106 apple (Malus domestica Borkh.) trees were initially sprayed in 1985 with paclobutrazol (PB) at 250 mg.liter-1 at tight cluster and again on 10 and 25 June and 29 July. From 1986 through 1988, PB sprays of 85 or 100 mg.liter-1 were applied at either petal fall (PF) + 2 or PF + 4 weeks and one to two additional sprays were applied per year when growth resumed. Promalin was applied to one group of trees that received PB starting at PF + 2 weeks. PB reduced terminal, lateral, and total shoot growth the year of application and in subsequent years. Although average shoot length of lateral and terminal shoots was reduced, the greatest reduction in growth occurred because PB prevented spurs from growing into lateral and terminal shoots. Compared to unsprayed trees, PB reduced pruning time in all 4 years by 23% to 70%. PB increased bloom only the first year after application, but increased fruit set for 2 years due to a carryover effect. Application of PB in 1985 caused a reduction in fruit size, sometimes in soluble solids concentration, length : diameter (L : D) ratio, and pedicel length. Promalin either overcame the reduction in the ratio or increased it in 1986. Reduced rates of PB in subsequent years caused few adverse effects on the fruit. PB increased flesh firmness when applied at PF + 2 weeks but not at PF + 4 weeks. Trees treated with PB produced fruit with higher flesh Ca and less bitter pit, cork spot, and senescent breakdown following regular air storage. Chemical names used: beta-(4-chlorophenyl)methyl-alpha-(1,1-dimethylethyl)-1H-1,2, 4-triazole-1-ethanol (paclobutrazol, PB); gibberellins A4+7 Plus N-(phenylmethyl)-1H-purine-6-amine (Promalin). Journal of the American Society for Horticultural Science. Sept 1991. v. 116 (5). p. 807-812. Includes references. (NAL Call No.: DNAL 81 SO12).

1692

Response of 'Top Red Delicious' apples to daminozide.
JFQUD. Drake, S.R. Baranowski, J.D.; Williams, M.W. Trumbull, Conn. : Food & Nutrition Press. Daminozide was applied at 2.2, 4.5, 6.7 or 9.0 kg/ha to 'Top Red Delicious' apple trees 86 days after full bloom the first year and at 2.2, 3.4 or 4.5 kg/ha, 80 days after full bloom the second year. At commercial harvest, after 2 and 4 months regular cold storage, and after 6 and 10 months of controlled atmosphere (CA) storage apples were evaluated for carbon dioxide, ethylene production, flesh firmness, external color, soluble solids, acids, subjective appearance and daminozide residue. Ethylene production was reduced as daminozide application was increased. Delay in onset of the climacteric ranged from 3 to 21 days depending on chemical rate used. Firmness, red color, acids, subjective appearance and number of days to reach climacteric were significantly improved by all rates of daminozide. Quality differences due to daminozide were evident following both types of storage. Daminozide residues were directly related to rate and did not dissipate during storage. There was no detectable daminozide carry-over in fruit from year to year. Journal of food quality. 1989. v. 12 (3). p. 193-202. Includes references. (NAL Call No.: DNAL TP373.5.J6).

1693

Ripening and storability of 'Marshall McIntosh' apples.
FVRJA. Autio, W.R. Bramlage, W.J.; Lord, W.J. University Park, Pa. : American Pomological Society. Fruit varieties journal. Jan 1990. v. 44 (1). p. 36-40. ill. Includes references. (NAL Call No.: DNAL 80 F9464).

1694

The role of ethylene in determining apple harvest and storage life.
Kupferman, E.M. Pullman, Wash. : Washington State University Cooperative Extension. Postharvest pomology newsletter. May 1986. v. 4 (1). p. 16-21. (NAL Call No.: DNAL TP440.P67).

1695

Root hypoxia and storage breakdown of 'Jonathan' apples.
JOSHB. Gur, A. Meir, S. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Sept 1987. v. 112 (5). p. 777-783. Includes references. (NAL Call No.: DNAL 81 S012).

1696

Rootstock affects ripening, size, mineral composition, and storability of 'Starkspur Supreme Delicious' in the 1980-81 NC-140 cooperative planting.
FVRJA. Autio, W.R. Barden, J.A.; Brown, G.R. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1991. v. 45 (4). p. 247-251. Includes references. (NAL Call No.: DNAL 80 F9464).

1697

Skin color in 'Newtown' apples treated with calcium nitrate, urea, diphenylamine, and a film coating.
HJHSA. Meheriuk, M. Alexandria, Va. : American Society for Horticultural Science. HortScience. July 1990. v. 25 (7). p. 775-776. Includes references. (NAL Call No.: DNAL SB1.H6).

1698

Status of efforts to meet Japanese import quarantine requirements for apples.
WSEPA. Moffitt, H. Pullman, Wash. : The Society. Proceedings of the Washington State Entomological Society. Meeting held on April 23 and September 17, 1988, Yakima, Washington. 1988. (50). p. 863-864. (NAL Call No.: DNAL QL461.W3).

1699

Study of impact and compression damage on Asian pears.
Chen, P. Ruiz, M.; Lu, F.; Kader, A.A. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1986 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1986. (fiche no. 86-3025). 20 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

1700

A tentative model to describe the respiration of stored apples.
JOSHB. Andrich, G. Fiorentini, R.; Tuci, A.; Zinnai, A.; Sommovigo, G. Alexandria, Va. : The Society. Using mathematical equations that describe the O2 mass-transfer and the enzymatic oxidation of the organic substrates of apples (Malus domestica Borkh.), we developed a kinetic model to correlate fruit respiration rate with environmental oxygen partial pressure (PO2). The kinetic determinations were carried out at room temperature using apples stored at 3 to 4C for 11 to 19 weeks. Results show that: 1) the calculated value of the Michaelis-Menten constant related to the enzymatic oxidation of the respiratory substrate (Km = 2.1 +/- 0.5.10-5 mol.kg-1) is close to that reported in the literature for cytochrome-c oxidase; 2) the located range of PO2 levels where O2 becomes the limiting factor in the respiration process (near 2.6 kPa at T = 20.5 +/- 1C) is close to those usually used on a commercial scale for controlled atmosphere storage. Journal of the American Society for Horticultural Science. May 1991. v. 116 (3). p. 478-481. Includes references. (NAL Call No.: DNAL 81 S012).

1701

Tolerance of three apple cultivars to ultra-low levels of oxygen.
HJHSA. Lau, O.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Nov 1990. v. 25 (11). p. 1412-1414. Includes references. (NAL Call No.: DNAL SB1.H6).

1702

EPA: uniroyal agrees to halt U.S. sales of Alar.
Washington, D.C. : Community Nutrition Institute. Abstract: Uniroyal Chemical Company has agreed to halt sales of Alar in the United States. This decision was in reponse to government and consumer concerns to risks of the pesticide on apples. The apple industry response and foreign sales are also discussed. Nutrition week. June 8, 1989. v. 19 (23). p. 6. (NAL Call No.: DNAL TX341.C6).

1703

Alar: the numbers game.
SCIEA. Roberts, L. Washington, D.C. : American Association for the Advancement of Science. The dispute over the cancer danger from Alar highlights just how uncertain risk assessment is. Science. Mar 17, 1989. v. 243 (4897). p. 1430. (NAL Call No.: DNAL 470 SCI2).

1704

Anatomy of a disaster.
O'Rouke, A.D. New York, N.Y. : John Wiley. Agribusiness. Sept 1990. v. 6 (5). p. 417-424. Includes references. (NAL Call No.: DNAL HD1401.A56).

1705

Apple sales strong despite scarce in '89 about chemical use.
NYTIAO. Shabecoff, P. New York, N.Y. : H.J. Raymond & Co. . The New York times. Nov 13, 1990. p. A1, A11. (NAL Call No.: DNAL 286.8 N488).

1706

Bad apples.
Yonkers, N.Y. : The Union. The history of the discovery of UDMH (a breakdown product formed when alar containing products are cooked) as health hazards and attempts to ban alar's use is outlined. The sensitivity of two testing methods (PAM II and Conditt) is briefly discussed. Environmental Protection Agency (EPA) regulations; the reaction of the baby food industry; and the results of Consumer Reports testing of apples and apple juices are presented. The health risk of cancer from UDMH consumption and recommendations are included. Consumer reports - Consumers Union of United States. May 1989. v. 54 (5). p. 288-290, 292. ill., charts. (NAL Call No.: DNAL 321.8 C762).

1707

Comparisons of calcium chloride, calcium phosphate, and a calcium chelate as foliar sprays for 'McIntosh' apple trees.
JOSHB. Bramlage, W.J. Drake, M.; Weis, S.A. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1985. v. 110 (6). p. 786-789. Includes 22 references. (NAL Call No.: DNAL 81 SO12).

1708

Determination and persistence of several fungicides in postharvest-treated apples during their cold storage.
JAFCAU. Cano, P. Plaza, J.L. de la; Munoz-Delgado, L. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Jan/Feb 1987. v. 35 (1). p. 144-147. ill. Includes references. (NAL Call No.: DNAL 381 J8223).

1709

Determination of daminozide and dimethylhydrazine residues in Swiss apple juice concentrates using gas chromatography-mass spectrometry.
JAFCAU. Rutschmann, M.A. Buser, H.R. Washington, D.C. : American Chemical Society. Apple juice concentrates analyzed for daminozide and 1,1-dimethylhydrazine (UDMH) by a sensitive gas chromatographic mass spectrometric (GC-MS) method showed with the exception of one sample no detectable concentrations of daminozide. The exceptive sample showed traces of daminozide (0.07 ppm) that could have resulted from the illegal use of daminozide by one fruit grower from more than a hundred. The samples were collected from large-scale storage tanks in different regions in Switzerland and represented a cross section of Swiss production. The samples were analyzed for daminozide after alkaline digestion to UDMH and derivatization to pentafluorobenzoyl derivatives. The exceptive apple juice concentrate was further analyzed directly for UDMH by isolation via cation-exchange chromatography and derivatization. No UDMH was found in this analysis. Comparative analysis showed the GC-MS method to be much less susceptible to interfering compounds than electron capture detection. Other hydrazines were comparatively analyzed and GC and MS properties of the pentafluorobenzoyl derivatives reported. Journal of agricultural and food chemistry. Jan 1991. v. 39 (1). p. 176-181. Includes references. (NAL Call No.: DNAL 381 J8223).

1710

Determination of several pesticides with a chemical ionization ion trap detector.
JAFCAU. Mattern, G.C. Singer, G.M.; Louis, J.; Robson, M.; Rosen, J.D. Washington, D.C. : American Chemical Society. A total of one hundred (twenty five each) apple, peach, tomato, and potato samples were analyzed for twelve pesticides and two pesticide metabolites with a slightly modified Luke multiresidue extraction procedure, separation by capillary column gas chromatography with cold on-column injection, and detection by mass chromatography with an ion trap mass spectrometer in the chemical ionization mode (GC/CIMS). Residues of carbaryl, captan, dichloran, dimethoate, methamidophos, phosmet, and tetrahydrophthalimide were found in several samples, with peaches containing the most

residues. None of the residues found were above legal tolerances. Recovery studies were performed at the 0.5 ppm fortification level of each pesticide and metabolite at least three times in each of the four crops. Recoveries were between 73 and 120%, with an average coefficient of variation of 11%. Because the computer can be programmed to search for several hundred targeted ions, the use of capillary column GC/CIMS is a promising method that should be explored by regulatory agencies for the analysis of pesticide residues. Journal of agricultural and food chemistry. Feb 1990. v. 38 (2). p. 402-407. Includes references. (NAL Call No.: DNAL 381 J8223).

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Effects of cobalt gamma radiation on San Jose scale (Homoptera: Diaspididae) survival on apples in cold and controlled-atmosphere storage.
JEENAI. Angerilli, N.P.D. Fitzgibbon, F. Lanham, Md. : Entomological Society of America. 'Red Delicious' apples (Malus pumila (Mill.)) infested with San Jose scale, Quadraspidiotus perniciosus (Comstock), harvested from commercial and experimental orchards were subjected to cobalt-60 gamma radiation and then stored in either regular cold storage, controlled-atmosphere storage, or at room temperature. Scale survival measured at various intervals after treatment declined with time and the magnitude of the radiation dose received. Survival was not influenced by method of storage. Journal of economic entomology. June 1990. v. 83 (3). p. 892-895. Includes references. (NAL Call No.: DNAL 421 J822).

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Enhanced resistance to side rot in pears treated with calcium chloride during the growing season.
PLDIDE. Sugar, D. Powers, K.A.; Hilton, R.J. St. Paul, Minn. : American Phytopathological Society. Plant disease. Feb 1991. v. 75 (2). p. 212-214. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Evaluation of mature apple fruit from Washington State for the presence of Erwinia amylovora.
PLDIDE. Roberts, R.G. Reymond, S.T.; McLaughlin, R.J. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov, 1989. v. 73 (11). p. 917-921. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1714

GC/MS and LC/MS determination of 20 pesticides for which dietary oncogenic risk has been estimated.
JAFCAU. Mattern, G.C. Liu, C.H.; Louis, J.B.; Rosen, J.D. Washington, D.C. : American Chemical Society. The National Research Council has estimated dietary oncogenic risk for 28 pesticides registered for use in the United States. We report a rapid analytical procedure for 20 of these pesticides in a variety of crops based on a single extraction step and the use of mass spectrometry for detection and quantification. Recovery and sensitivity studies were performed in various commodities (apples, peaches, potatoes, tomatoes, peppers, spinach, lettuce, snap beans, and sweet corn) for the suspected oncogens acephate, alachlor, azinphos-methyl, captafol, captan, chlordimeform, chlorothalonil, cypermethrin, diclofopmethyl, ethalfluralin, metolachlor, oxadiazon, parathion, permethrin, pronamide, o-phenylphenol, terbutryne, folpet, linuron,and oryzalin. All pesticides were determined by gas chromatography/chemical ionization mass spectrometry (GC/CIMS) except the last three, for which high-performance liquid chromatography/mass spectrometry (HPLC/MS) was used. Average recoveries at the 0.5 ppm fortification level were between 70 and 123%, with an average coefficient of variation of 13%. Sensitivity studies demonstrated that most pesticides could be detected at 0.05 or 0.10 ppm in the crops, but some limits of detection were 0.25 ppm or greater. Journal of agricultural and food chemistry. Apr 1991. v. 39 (4). p. 700-704. Includes references. (NAL Call No.: DNAL 381 J8223).

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Incidence and development of apple scab on fruit during the late summer and while in storage /by Cyril O. Bratley.
Bratley, C. O. 1903-1948. Washington : U.S. Dept. of Agriculture, 1937. Caption title. 46 p. : ill. ; 23 cm. Literature cited: p. 43-45. (NAL Call No.: DNAL 1 Ag84Te no.563).

1716

Malathion bait sprays for control of apple maggot (Diptera: Tephritidae).
JEENAI. Mohammad, A.B. Aliniazee, M.T. Lanham, Md. : Entomological Society of America. Malathion (1.2 g AI /liter, applied at 2-wk intervals for a total of four spray applications) was compared with malathion mixed with 0.25 and 0.5% Nulure bait for control of the apple maggot, Rhagoletis pomonella (Walsh), in 1986 and 1987 seasons. Apples sprayed with malathion mixed with Nulure had the lowest fruit injury in both years. In 1986, fruit injury averaged 18.3 +/- 16.4% (average +/- SEM) in apples treated with malathion bait mixture compared with 39.0 +/- 9.5% in apples treated with malathion alone and 56.3 +/- 15.5% in untreated apples. In 1987, apple maggot injury in apples treated with malathion bait

mixture averaged 3.7 +/- 3.2% compared with 45.7 +/- 2.7% in apples treated with malathion alone and 26.7 +/- 22.2% in untreated apples. Laboratory bioassays of residual toxicities of malathion against apple maggot adults at a rate of 1.2 g (AI)/liter indicated efficacy of less than 1 wk and complete ineffectiveness within 12 d after application on apple foliage and fruits. At the higher rate of 2.4 g (AI)/liter, only 17% mortality was noticed 16 d after application. Further laboratory tests indicated total adult mortality within 48 h and negligible rates of oviposition (less than 1 egg per female) in apples treated with malathion at rates of 0.3 and 0.6 g (AI)/liter mixed with 1% Nulure bait. In apples treated with malathion alone, 29 +/- 7.7% mortality occurred and 10 eggs per female were deposited at the end of 48 h for 0.3 (AI)/liter rate, and 21 +/- 7.7% mortality occurred and 16 eggs per female were deposited for 0.6 g (AI)/liter rate. Nulure alone at 1% had no adverse effects on survival and oviposition of apple maggot females. Results of these field and laboratory experiments showed that addition of Nulure bait to malathion increased adult mortality and reduced oviposition in treated apples. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1716-1721. Includes references. (NAL Call No.: DNAL 421 J822).

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Monitoring residues of carbendazim (applied as benomyl) and thiabendazole in Wellspur apples.
JANCA2. Monico-Pifarre, A. Xirau-Vayreda, M. Arlington, Va. : The Association. Association of Official Analytical Chemists journal. May/June 1987. v. 70 (3). p. 596-598. Includes references. (NAL Call No.: DNAL 381 AS7).

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Much ado about apples.
Stark, C. Ithaca, N.Y. : New York State College of Human Ecology, Cornell University. Human ecology forum. Spring 1989. v. 17 (3). p. 23-26. ill. (NAL Call No.: DNAL HV1.H8).

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Penicillium solitum revived, and its role as a pathogen of pomaceous fruit.
PHYTA. Pitt, J.I. Spotts, R.A.; Holmes, R.J.; Cruickshank, R.H. St. Paul, Minn. : American Phytopathological Society. Penicillium solitum, a species neglected in recent taxonomies, is revived. A new description and related taxonomic information are given, based on examination of a number of fresh isolates from pome fruit and wooden fruit bin surfaces in Australia and from processed meats in Germany. Isolates of P. solitum were less virulent on apple and pear fruits than those of P. expansum, the dominant pathogenic Penicillium on pome fruits. P. solitum and P. expansum showed similar temperature growth curves, but growth of P. solitum was slower. All isolates of P. solitum from fruit and fruit storage bins in this study were insensitive to benomyl, but isolates from meat and cheese were sensitive to benomyl. Phytopathology. Oct 1991. v. 81 (10). p. 1108-1112. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Protectant and after-infection activity of fungicides against Botryosphaeria obtusa on apple.
PLDIDE. Arauz, L.F. Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. Plant disease. Dec 1990. v. 74 (12). p. 1029-1034. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Removal of spray residue from apples /by W.S. Hough ... et al. .
Hough, Walter Seneff,_1893-. Blacksburg, Va. : Virginia Polytechnic Institute. Virginia Agricultural Experiment Station, 1931. 16 p. : ill. ; 23 cm. (NAL Call No.: DNAL 100 V815 (1) no.278).

1722

Residue levels in apples and pears field-treated with two experimental chlorothalonil formulations.
BECTA6. Camoni, I. Di Muccio, A.; Pontecorvo, D.; Rubbiani, M.; Vergori, L.; Lugaresi, C. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Mar 1991. v. 46 (3). p. 361-367. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

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Residues of benomyl (determined as carbendazim) and captan in postharvest-treated pears in cold storage.
JAFCAU. Kiigemagi, U. Inman, R.D.; Mellenthin, W.M.; Deinzer, M.L. Washington, D.C. : American Chemical Society. Residues of carbendazim (applied as benomyl) and captan, applied to pears prior to cold storage, were examined during 6 months of storage. Total carbendazim residues were below the 7 ppm tolerance, initial residues averaging 0.37 ppm, and no reduction of residues was detected during cold storage. In another study, three postharvest application techniques were compared and again no significant differences in the quantities of the residues found. Captan residues on Anjou pears were insignificant. The analytical procedure used for these analyses was an acetone extraction of acidified pear puree followed by partitioning with ethyl acetate to separate total carbendazim (benomyl plus carbendazim) and captan residues. For captan residue, charcoal and silica gel cleanup of the organic extract was followed by electron

capture GLC. The pH of the aqueous extract containing carbendazim was adjusted to about 9 with sodium hydroxide, and the carbendazim residue was partitioned into ethyl acetate and analyzed by HPLC. Journal of agricultural and food chemistry. Feb 1991. v. 39 (2). p. 400-403. Includes references. (NAL Call No.: DNAL 381 J8223).

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Avoid apple bruising.
WEFGA. Aylsworth, J. Willoughby, Ohio : Meister Publishing Company. Western fruit grower. This publication is not owned by the National Agricultural Library. Nov 1988. v. 108 (1). p. 14, 16-17. ill. (NAL Call No.: DNAL 80 G85W).

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Bruising impact data acquisition and analysis in apple packing and handling systems utilizing the instrumented sphere (IS).
Tennes, B.R. Zapp, H.R.; Marshall, D.E.; Armstrong, P.R. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-6032). 14 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

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Development of a sampling plan and application of a grading scheme for determining apple packout losses.
HJHSA. Hogmire, H.W. Baugher, T.A.; Ingle, M.; Lightner, G.W. Alexandria, Va. : American Society for Horticultural Science. HortScience. Aug 1989. v. 24 (4). p. 628-630. Includes references. (NAL Call No.: DNAL SB1.H6).

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Apple orchard management in relation to quality.
NEMFA. Bramlage, W.J. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 64-67. (NAL Call No.: DNAL 81 M384).

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JFQUD. Curry, E.A. Westport, Conn. : Food & Nutrition Press. Journal of food quality. 1988. v. 11 (2). p. 79-87. ill. Includes references. (NAL Call No.: DNAL TP373.5.J6).

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Throop, J.A. Rehkugler, G.E.; Upchurch, B.L. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-6567). 26 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

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Big apples--how do we get them?.
PWHAA. Heinicke, D.R. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 107-109. (NAL Call No.: DNAL 81 W273).

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HJHSA. Hogmire, H.W. Baugher, T.A.; Ingle, M.; Lightner, G.W. Alexandria, Va. : American Society for Horticultural Science. HortScience. Aug 1989. v. 24 (4). p. 628-630. Includes references. (NAL Call No.: DNAL SB1.H6).

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Development of a system for automated detection of apple bruises.
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Effect of a foliar urea application and mite injury on yield and fruit quality of apple.
JEENAI. Beers, E.H. Hull, L.A.; Greene, G.M. Lanham, Md. : Entomological Society of America. Malus X domestica Borkhauser, 'Bisbee Delicious' and 'Rome Beauty' apple trees were subjected to varying amounts (range, approximately 20-1,140) of European red mite, Panonychus ulmi (Koch), injury and then treated with a foliar urea to determine if the effects of mite injury, could be mitigated. The effects of these treatments were determined on mean fruit weight, soluble solids, fruit firmness, fruit color, leaf nitrogen, and number of actively growing shoots at harvest, as well as return bloom, percentage of fruit set, and crop load the following season. Mean fruit weight, fruit firmness, and percentage of leaf nitrogen in August and September were affected by mite injury on 'Bisbee Delicious,' whereas with 'Rome Beauty' soluble solids, fruit color, and percentage of leaf nitrogen in August were affected by mite injury. The only effect of the urea application after mite injury was a reduction in red color of 'Bisbee Delicious.'. Journal of economic entomology. Apr 1990. v. 83 (2). p. 552-556. Includes references. (NAL Call No.: DNAL 421 J822).

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Effects of daminozide and paclobutrazol treatments on fruit ripening and storage behavior of 'McIntosh' apple.
JOSHB. Elfving, D.C. Chu, C.L.; Lougheed, E.C.; Cline, R.A. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1987. v. 112 (6). p. 910-915. Includes references. (NAL Call No.: DNAL 81 S012).

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HJHSA. Rouchaud, J. Moons, C.; Meyer, J.A. Alexandria, Va. : American Society for Horticultural Science. HortScience. Aug 1986. v. 21 (4). p. 1056-1057. Includes references. (NAL Call No.: DNAL SB1.H6).

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The effects of postharvest infiltration of calcium, magnesium, or strontium on decay, firmness, respiration, and ethylene production in apples.
JOSHB. Conway, W.S. Sams, C.E. Alexandria, Va. : The Society. Journal of the American Society

for Horticultural Science. Mar 1987. v. 112 (3). p. 300-303. Includes references. (NAL Call No.: DNAL 81 S012).

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CFRTA. Schupp, J.R. Ferree, D.C. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. 1987. v. 20. p. 76-80. ill. Includes references. (NAL Call No.: DNAL 93.5 D96).

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Effects of sequential low-oxygen and standard controlled atmosphere storage regimens on apple quality.
JOSHB. Lidster, P.D. Lougheed, E.C.; McRae, K.B. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Sept 1987. v. 112 (5). p. 787-793. Includes references. (NAL Call No.: DNAL 81 S012).

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JEENAI. Hull, L.A. Rajotte, E.G. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1721-1736. Includes references. (NAL Call No.: DNAL 421 J822).

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Evaluation of apple fruit maturity to segregate fruit for optimum storage potential.
ARHMA. Beaudry, R.M. Dilley, D.R. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1990. (120th). p. 193-194. (NAL Call No.: DNAL 81 M58).

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Evaluation of ripening and fruit quality of 'Gala' and 'McIntosh' apples at harvest and following air storage.
FVRJA. Greene, D.W. Autio, W.R. University Park, Pa. : American Pomological Society. Fruit varieties journal. July 1990. v. 44 (3). p. 117-123. Includes references. (NAL Call No.: DNAL 80 F9464).

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PWHAA. Schotzko, T. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 92-96. (NAL Call No.: DNAL 81 W273).

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Gibberellins A4+7 influence fruit set, fruit quality, and return bloom of apples.
JOSHB. Greene, D.W. Alexandria, Va. : The Society. Several experiments were conducted to evaluate the influence of time, concentration, and number of GA4+7 applications on 'McIntosh', 'Early McIntosh', and 'Empire' apples (Malus domestica Borkh.). GA4+7 at 150 mg/liter increased fruit set and inhibited flower bud formation on 'McIntosh' and 'Early McIntosh'. Flower bud formation was inhibited on 'McIntosh' when GA4+7 was applied over a wide range of times from 6 days before full bloom to 34 to 35 days after full bloom. Applications made 45 and 60 days after full bloom had no effect. Following storage, 'Empire' fruit treated with GA4+7 were softer and had a higher incidence of senescent breakdown than controls. Postbloom sprays of GA4+7 increased fruit set on 'Empire' one year when applied from 0 to 150 mg/liter, while two applications of 50 mg/liter on similar trees in another year caused thinning. GA4+7 sprays appeared to advance ripening of 'Empire' apples. Gibberellin sprays reduced seed number. GA4+7 inhibited flowering in 'Empire'. Repeat applications 19 and 34 days after full bloom were only slightly more inhibitory to flowering than one application of 0, 50, 100, or 150 mg/liter made 10 days after full bloom. Journal of the American Society for Horticultural Science. July 1989. v. 114 (4). p. 619-625. Includes references. (NAL Call No.: DNAL 81 S012).

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How can we grow and maintain quality apples and cherries.
ARHMA. Carpenter, W.S. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1986. (116th). p. 96-100. (NAL Call No.: DNAL 81 M58).

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ARHMA. Rasch, F. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1986. (116th). p. 93-95. (NAL Call No.: DNAL 81 M58).

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How spur quality influences fruit size.
PWHAA. Rom, C.R. Wenatchee, Wash. : The Association. Proceedings - Washington State Horticultural Association. 1985. (81st). p. 109-118. 111. Includes references. (NAL Call No.: DNAL 81 W273).

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Influence of apple green crinkle disease on the quality of Granny Smith apples.
PLDRA. Fridlund, P.R. Drake, S.R. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1987. v. 71 (7). p. 585-587. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Influence of maturity, storage procedure, temperature, and oxygen concentration on quality and disorders of 'McIntosh' apples.
JOSHB. Lau, O.L. Yastremski, R.; Meheriuk, M. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Jan 1987. v. 112 (1). p. 93-99. ill. Includes 18 references. (NAL Call No.: DNAL 81 SO12).

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Maturity standards for harvesting Bartlett pears for eastern shipment /F.W. Allen.
Allen, F. W. 1887-. Berkeley, Cal. : Agricultural Experiment Station, 1929. Cover title. 27 p. : ill. (some col.) ; 24 cm. (NAL Call No.: DNAL 100 C12S no.470).

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ARHMA. Rasch, M. East Lansing, Mich. : The Society. Annual report - Michigan State Horticultural Society. 1986. (116th). p. 80-85. Includes references. (NAL Call No.: DNAL 81 M58).

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FVRJA. Kappel, F. Quamme, H.A. University Park, Pa. : American Pomological Society. Fruit varieties journal. Oct 1987. v. 41 (4). p. 136-140. Includes references. (NAL Call No.: DNAL 80 F9464).

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Manalo, A.B. Lord, W.G. Durham, N.H. : The Station. Research report - New Hampshire Agricultural Experiment Station. Apr 1990. (123). 7 p. Includes references. (NAL Call No.: DNAL S89.E2).

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CFRTA. Barritt, B.H. Rom, C.R. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. 1987. v. 20. p. 70-75. ill. Includes references. (NAL Call No.: DNAL 93.5 D96).

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Response of 'Top Red Delicious' apples to daminozide.
JFQUD. Drake, S.R. Baranowski, J.D.; Williams, M.W. Trumbull, Conn. : Food & Nutrition Press. Daminozide was applied at 2.2, 4.5, 6.7 or 9.0 kg/ha to 'Top Red Delicious' apple trees 86 days after full bloom the first year and at 2.2, 3.4 or 4.5 kg/ha, 80 days after full bloom the second year. At commercial harvest, after 2 and 4 months regular cold storage, and after 6 and 10 months of controlled atmosphere (CA) storage apples were evaluated for carbon dioxide, ethylene production, flesh firmness, external color, soluble solids, acids, subjective appearance and daminozide residue. Ethylene production was reduced as daminozide application was increased. Delay in onset of the climacteric ranged from 3 to 21 days depending on chemical rate used. Firmness, red color, acids, subjective appearance and number of days to reach climacteric were significantly improved by all rates of daminozide. Quality differences due to daminozide were evident following both types of storage. Daminozide residues were directly related to rate and did not dissipate during storage. There was no detectable daminozide carry-over in fruit from year to year. Journal of food quality. 1989. v. 12 (3). p. 193-202. Includes references. (NAL Call No.: DNAL TP373.5.J6).

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Yonkers, N.Y. : The Union. Common concerns about consumption of apples and apple products made from alar-treated fruit and cancer risk are addressed in a question and answer format. Consumer reports - Consumers Union of United States. May 1989. v. 54 (5). p. 291. (NAL Call No.: DNAL 321.8 C762).

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Apples: managing pesticides for crop production and water quality protection--a supplement to the IFAS Pest Control Guides.
Hornsby, A.G. Buttler, T.M.; Crocker, T.E.; Mizell, R.F. III; Dunn, R.A.; Simone, G.W. Gainesville, Fla. : The Service. Circular - Florida Cooperative Extension Service. In subseries: Water Quality Initiative Series. May 1991. (962). ii p. (NAL Call No.: DNAL 275.29 F66C).

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Fate of insecticide sprays from apple orchards.
NEMFA. Clark, J.M. Marion, J.R.; Tessier, D.M.; Coli, W.M. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1986. v. 92. p. 76-89. Includes 8 references. (NAL Call No.: DNAL 81 M384).

1770

Fluidized bed material applied at disposal levels: effects on an apple orchard.
JEVQAA. Korcak, R.F. Madison, Wis. : American Society of Agronomy. Atmospheric fluidized-bed combustion represents an economical technology for the burning of high S fossil fuel. The combustion residue is a dry, alkaline material resulting from the burning of coal (or other fuel source) and limestone. Although the residue has been assessed as a limestone substitute, the current study examines the potential for disposing of relatively large quantities. Fluidized bed material (FBM) was applied at two rates to the surface area within the rows of an established apple (Malus domestica Borkh.) orchard containing four tree types. The rates were either 9.2 kg/m2 (low rate), 36 kg/m2 (high rate), or untreated control. The tree types used were 'Spuree Rome' on M9, 'Redchief Delicious' on M9 or M9/MM106, and 'Sturdeespur Delicious' on M9. Cumulative yields (kg/tree) were enhanced on three of four tree types over a period of 6 yr. A 15% reduction in yield was noted for Redchief Delicious on M9/MM106 stocks at the high FBM rate. No nutritional related problems were noted for this or any other of the the tree types used. Part of the yield reduction noted was due to fruit size differences and/or differential sensitivity of this interstock/rootstock combination to the altered soil chemical properties. Generally, amended soil pH increased to about 7.0 for either rate, and electrical conductivity increased five fold at the high rate of FBM addition. Agricultural utilization of large volumes (up to 112 Mg/ha) of FBM, compared to past research whereFBM was used as a lime substitute (2-6 mg/ha), appears to be a feasible alternative. However, rootstock selection for apple may need to consider the resultant changes in soil chemical status from FBM additions. Journal of environmental quality. July/Sept 1988. v. 17 (3). p. 469-473. Includes references. (NAL Call No.: DNAL QH540.J6).

1771

Much ado about apples.
Stark, C. Ithaca, N.Y. : New York State College of Human Ecology, Cornell University. Human ecology forum. Spring 1989. v. 17 (3). p. 23-26. ill. (NAL Call No.: DNAL HV1.H8).

1772

Pears: managing pesticides for crop production and water quality protection--a supplement to the IFAS pest control guides.
Hornsby, A.G. Buttler, T.M.; Crocker, T.E.; Mizell, R.F. III; Dunn, R.A.; Simone, G.W. Gainesville, Fla. : The Service. Circular - Florida Cooperative Extension Service. In subseries: Water Quality Initiative Series. May 1991. (995). ii p. (NAL Call No.: DNAL 275.29 F66C).

1773

Survey for pesticides in wells associated with apple and peach orchards in West Virginia.
BECTA6. Hogmire, H.W. Weaver, J.E.; Brooks, J.L. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Jan 1990. v. 44 (1). p. 81-86. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

1774

Apple impact bruise prediction models.
Siyami, S. Brown, G.K.; Burgess, G.J.; Gerrish, J.B.; Tennes, B.R.; Burton, C.L.; Zapp, H.R. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the i987 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-60i9). 22 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

1775

Azinphosmethyl resistance and weight-related response of obliquebanded leafroller (Lepidoptera: Tortricidae) larvae to insecticides.
JEENAI. Reissig, W.H. Stanley, B.H.; Hebding, H.E. College Park, Md. : Entomological Society of America. Journal of economic entomology. Includes statistical data. Apr i986. v. 79 (2). p. 329-333. Includes references. (NAL Call No.: DNAL 421 J822).

1776

Binomial sampling plans for tentiform leafminer (Lepidoptera: Gracillaridae) on apple in Utah.
JEENAI. Jones, V.P. Lanham, Md. : Entomological Society of America. The dispersion of Phyllonorycter elmaella Doganlar & Mutuura (Lepidoptera: Gracillaridae), a tentiform leafminer infesting apple in Utah, was investigated over a 3-yr period. According to Taylor's power law, mines are only slightly clumped on a per leaf basis (alpha = i.i4, beta = 1.05, r2 = 0.94). Two different binomial sampling plans based on a constrained negative binomial distribution were evaluated to estimate populations of leaf miners near the one to three mines per leaf economic threshold proposed for other leafminers of this genus attacking apple in the eastern United States. The proportion of leaves infested could not provide accurate predictions over 1.7 mines per leaf; however, the proportion of leaves infested with two or more mines predicted levels above three mines per leaf accurately. The use of this sampling plan in pest management programs is discussed. Journal of economic entomology. Apr i99i. v. 84 (2). p. 484-488. Includes references. (NAL Call No.: DNAL 421 J822).

1777

Binomial sequential classification sampling plans for European red mite (Acari: Tetranychidae) with special reference to performance criteria.
JEENAI. Nyrop, J.P. Agnello, A.M.; Kovach, J.; Reissig, W.H. Lanham, Md. : Entomological Society of America. Binomial sequential sampling procedures were developed for classifying the density of European red mites, Panonychus ulmi (Koch), with respect to four critical densities. Frequencies of erroneous classifications made using these sampling procedures and average sample sizes required to make classifications were compared with sequential sampling procedures that used complete counts of mites on leaves. The binomial procedures required approximately the same average sample size and had approximately the same frequency of erroneous classification. The sample size efficiency of the binomial sequential classification sampling plan was compared and found superior to the sample size efficiency of an estimation procedure based on binomial sampling. Field testing of one of the binomial sequential classification sampling plans showed that it rapidly and correctly classified mite densities. Journal of economic entomology. Apr 1989. v. 82 (2). p. 482-490. Includes references. (NAL Call No.: DNAL 421 J822).

1778

Damage threshold for pear psylla nymphs (Homoptera: Psyllidae).
JEENAI. Burts, E.C. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr i988. v. 8i (2). p. 599-60i. Includes references. (NAL Call No.: DNAL 42i J822).

1779

Development of oxygen concentration gradients in flesh tissues of bulky plant organs.
JOSHB. Rajapakse, N.C. Banks, N.H.; Hewett, E.W.; Cleland, D.J. Alexandria, Va. : The Society. Steady-state oxygen diffusion in flesh of apples (Malus domestica Borkh. cvs. Braeburn and Cox's Orange Pippin), Asian pears (Pyrus serotina Rehder. cvs. Hosui and Kosui), and nectarines Prunus persica (L.) Batsch. cvs. Red Gold and Sunglo was studied using a nondestructive method at 20C. Fruit flesh was found to exert a significant resistance to O2 diffusion resulting in measurable O2 gradients between tissues immediately beneath the skin and those at the fruit center for all these fruits. The magnitude of these O2 gradients varied between crops and cultivars and depended on the respiration rate and on effective O2 diffusivity in fruit flesh (Dc). Values of Dc varied with the cultivar and were broadly consistent with intercellular space volume. The range of Dc values obtained suggested that O2 diffusion in fruit flesh takes place in a combination of series and parallel modes in the intercellular space and fluid/solid matrix of the flesh. The results imply that O2 diffusivity in flesh tissues must be taken into consideration in the determination of critical external O2 level in controlled/modified atmosphere (CA/MA) storage. Journal of the American Society for Horticultural Science. Sept i990. v. i15 (5). p. 793-797. ill. Includes references. (NAL Call No.: DNAL 8i

SO12).

1780

Distribution Campylomma verbasci (Heteroptera: Miridae) nymphs on apple and an assessment of two methods of sampling.
JEENAI. Thistlewood, H.M.A. McMullen, R.D. Lanham, Md. : Entomological Society of America. The distribution of Campylomma verbasci (Meyer) nymphs was examined on apple trees, Malus domestica Borkh., during May, from 1982 to 1984, in the Okanagan Valley, B.C. Cluster samples, limb sections, and the limb tap method were used for these studies. Nymphs were found primarily within flower clusters and were associated with the European red mite, Panonychus ulmi (Koch), or webbing of lepidopteran larvae. The efficiency of limb tap sampling was estimated to be 71% of the population in the region tapped, and its estimates of mean density were not affected by spatial, temporal, or varietal factors within orchards. With relative net precision as a measure of precision and cost, limb tap sampling was 1.9 to 5.3 times more efficient than cluster sampling for determination of nymphal density at economic levels. However, intensive sampling is required during short period to achieve levels of precision acceptable for integrated pest management programs. Journal of economic entomology. Apr 1989. v. 82 (2). p. 510-515. Includes references. (NAL Call No.: DNAL 421 J822).

1781

An economic analysis of orchard rejuvenation in response to the reduction or the elimination of the use of Alar.
NEMFA. Kimball, M. Autio, W.R. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. 1987. v. 93. p. 44-52. (NAL Call No.: DNAL 81 M384).

1782

Fire blight and its control.
NEMFA. Steiner, P.W. North Amherst, Mass. : The Association. New England fruit meetings ... Proceedings of the ... annual meeting - Massachusetts Fruit Growers' Association. Meeting held January 31-February 1, 1990. 1990. v. 96. p. 39-43. (NAL Call No.: DNAL 81 M384).

1783

Foreign market promotion programs: an analysis of promotion response for apples, poultry, and tobacco.
Rosson, C.P. III. Hammig, M.D.; Jones, J.W. New York : John Wiley. Agribusiness, an international journal. Spring 1986. v. 2 (1). p. 33-42. Includes 16 references. (NAL Call No.: DNAL HD1401.A56).

1784

FROSTPRO, a model of overhead irrigation rates for frost/freeze protection of apple orchards.
HJHSA. Perry, K.B. Alexandria, Va. : American Society for Horticultural Science. HortScience. Aug 1986. v. 21 (4). p. 1060-1061. Includes references. (NAL Call No.: ONAL SB1.H6).

1785

The Georgian Bay apple industry.
CFRTA. Wilson, K.R. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. 1987. v. 20. p. 51-53. (NAL Call No.: ONAL 93.5 D96).

1786

High density pear planting and management on quince dwarfing rootstock: a practical venture.
CFRTA. Tehrani, G. East Lansing, Mich. : International Dwarf Fruit Tree Association. Compact fruit tree. Presented at the 30th Annual International Dwarf Fruit Tree Association Conference, Toronto, March, 1987. 1987. v. 20. p. 142-146. (NAL Call No.: DNAL 93.5 D96).

1787

Management of the apple maggot in the eastern United States.
OASPA. Reissig, W.H. Corvallis, Or. : The Station. Special report - Oregon State University, Agricultural Experiment Station. In the series analytic: Ecology and management of economically important fruit flies / edited by M.T. AliNiazee. July 1988. (830). p. 56-72. ill. Includes references. (NAL Call No.: DNAL 100 OR3M).

1788

Model for failure and plastic-flow in fruit collision.
Gan-Mor, S. Galili, N. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1987 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1987. (fiche no. 87-6021). 12 p. Includes references. (NAL Call No.: ONAL FICHE S-72).

1789

Model simulating the use of miticides to control European red mite (Acarina: Tetranychidae) in Nova Scotia apple orchards.
JEENAI. Hardman, J.M. Lanham, Md. : Entomological Society of America. A model was developed to simulate chemical control of the European red mite, Panonychus ulmi (Koch), in Nova Scotia apple orchards. Simulated densities of summer eggs and motile P. ulmi were similar to densities observed in experimental plots that had been treated with miticide on different dates. The P. ulmi model was used to estimate the best dates to apply miticides with different biological half-lives (7 or 30 d) and specific toxicities (i.e., toxic to all eggs; toxic only to summer eggs; toxic only to motile forms). Criteria of effectiveness of a given application were cumulative mite-days to 15 July, yield per tree, and density of P. ulmi winter eggs on 31 August. The best dates to apply miticide (usually shortly before or after winter eggs hatched) differed according to the characteristics of the miticide and the criterion of effectiveness (e.g., the best dates for preserving yield were not necessarily the best dates for reducing winter eggs). The model also indicated problems in the use of the current economic threshold based on counts of summer eggs and motile P. ulmi on leaves. If the initial P. ulmi population is moderate or high and the choice of application date is based on mite density on leaves, then application of miticide may be too late to prevent significant yield losses in the current year, a high population of winter eggs at the end of the season, and reduced return bloom and yield the following year. The model suggests the importance of early spring assessments of winter egg density and the necessity of considering age structure of the P. ulmi population and characteristics of the miticide in selecting dates for miticide application. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1411-1422. Includes references. (NAL Call No.: DNAL 421 J822).

1790

Modeling aerial dispersal of the apple scab fungus.
FOPSA. Aylor, D.E. New Haven, Conn. : The Station. Frontiers of plant science - Connecticut Agricultural Experiment Station. Fall 1990. v. 43 (1). p. 6-8. Includes references. (NAL Call No.: DNAL 100 F92).

1791

Physiology and prediction of fruit tolerance to low-oxygen atmospheres.
JOSHB. Ke, D. Rodriguez-Sinobas, L.; Kader, A.A. Alexandria, Va. : The Society. Fruits of 'Granny Smith' and 'Yellow Newtown' apples (Malus domestica Borkh), '20th Century' pear (Pyrus serotina L.), and 'Angeleno' plum (Prunus domestica L.) were kept in air and in 0.25% or 0.02% O2, at 0, 5, or 10C for 3, 7, 14, 25, or 35 days to study the effects of low-O2, atmospheres on their postharvest physiology and quality attributes. Soluble solids content (SSC), pH, and external appearance were not significantly influenced, but resistance to CO2, diffusion was increased by the low-O2 treatments. Exposures to the low-O2 atmospheres inhibited ripening, including reduction in ethylene production rate, retardation of skin color changes and flesh softening, and maintenance of titratable acidity. The most important detrimental effect of the low-O2, treatments was development of an alcoholic off-flavor that had a logarithmic relation with ethanol content of the fruits. The ethanol content causing slight off-flavor (EO) increased with SSC of the commodity at the ripe stage, and it could be estimated using the following formula: (Log EO)/SSC = 0.228. Using SSC of ripe fruits and average ethanol accumulation rate per day (VE) from each low-O2 treatment, the tolerance limit (T1) of fruits to low-O2, atmospheres could be predicted as follows: T1 = EO/VE = (10(0.228 SSC))/VE. Journal of the American Society for Horticultural Science. Mar 1991. v. 116 (2). p. 253-260. Includes references. (NAL Call No.: DNAL 81 S012).

1792

Principles of gas exchange in bulky plant tissues.
HJHSA. Solomos, T. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Factors that Influence Commodity Response to Controlled Atmosphere Storage of the XXII International Horticultural Congress/83rd ASHS Annual Meeting," August 14, 1986, Davis, California. Oct 1987. v. 22 (5). p. 766-771. Includes references. (NAL Call No.: DNAL SB1.H6).

1793

Quantifying apple maggot (Diptera: Tephritidae) preference for apples to optimize the distribution of traps among trees.
EVETEX. Murphy, B.C. Wilson, L.T.; Dowell, R.V. Lanham, Md. : Entomological Society of America. The spatial arid temporal distribution pattern of apple maggot, Rhagoletis pomonella (Walsh), fly captures was monitored among trees within an unmanaged apple orchard. Each tree within the orchard was monitored weekly for the presence of flies using sticky traps. Fruit maturity was monitored weekly to determine percentage soluble solids. Significantly more apple maggot were captured on trees with mature fruit than on trees with immature fruit. A selective predation model was used to quantify the effect of fruit preference on apple maggot captures. Two hypotheses were evaluated. The first hypothesis was that fly capture among trees is a function of the relative sequence or phenology of fruit maturation (tree category hypothesis). The second hypothesis was that fly capture among trees is a function of apple maturity among trees, regardless of the phenology, of fruit maturation (fruit maturity hypothesis;. Both models explained the

distribution of fly capture among trees early in the growing season, but the fruit maturity hypothesis best explained the entire season. The use of the model for predicting the distribution pattern of apple maggot captures and the optimum placement of traps for apple maggot detection are discussed. Environmental entomology. Aug 1991. v. 20 (4). p. 981-987. Includes references. (NAL Call No.: DNAL QL461.E532).

1794

Relationships of foliar azinphosmethyl concentration, exposure time, and mortality for the apple maggot (Diptera: Tephritidae).
JEENAI. Stanley, B.H. Reissig, W.H.; Shoemaker, C.A.; Robson, D.S. Lanham, Md. : Entomological Society of America. A laboratory bioassay to study the effects of azinphosmethyl on adult apple maggot, Rhagoletis pomonella (Walsh), mortality and oviposition was developed by placing apple branches bearing field-weathered residues inside a wind tunnel. Repellency by azinphosmethyl that was observed in a previous study did not occur. Thirty-six percent of the females died after 24 h of exposure to 29- to 30-d-old residues, and the oviposition punctures per females were 66% lower than that in the untreated controls. This reduction in oviposition was greater than would have been expected from mortality alone and is probably caused by sublethal poisoning. These results imply that sufficient protection may be provided by older residues (greater than 14d) when apple maggot populations are low. Mortality was described by two mathematical models, which were corrected for the time that the flies spent on the nontoxic walls. The relationships developed in this study should contributed to the development of a "treat-when-needed" strategy for apple maggot control. Journal of economic entomology. June 1989. v. 82 (3). p. 895-905. Includes references. (NAL Call No.: DNAL 421 J822).

1795

A revision of Mill's criteria for predicting apple scab infection periods.
PHYTAJ. MacHardy, W.E. Gadoury, D.M. St. Paul, Minn. : American Phytopathological Society. A review of published investigations of the relationship between leaf wetness, temperature, and infection of apples leaves by Venturia inaequalis indicated that infection by ascospores requires approximately 3 hr less than the interval reported by Mills and Laplante (Cornell Ext. Bull. 711, rev. 1951). Conidia require approximately 2.5 hr more than ascospores to infect apple foliage, rather than two-thirds the time required by ascospores, as stated by Mills. The discrepancy with ascospore infection could be explained by the daily periodicity of ascospore discharge, in which nearly all ascospores are released during the daytime. A revision of Mill's warning system is proposed which computes primary infection periods from 0700 hr when the rain begins at night and utilizes a new polynomial equation for predicting infection. The impact of the revised criteria on scab warning systems is discussed. Phytopathology. Mar 1989. v. 79 (3). p. 304-310. Includes references. (NAL Call No.: DNAL 464.8 P56).

1796

Sequential classification of prey/predator ratio with application to European red mite (Acari: Tetranychidae) and Typhlodromus pyri (Acari: Phytoseiidae) in New York apple orchards.
JEENAI. Nyrop, J.P. Lanham, Md. : Entomological Society of America. A sequential sampling procedure for calssifying the ratio of prey/predators with respect to a critical ratio was developed. This procedure was combined with a sequential density classification procedure for use in sampling European red mite (Panonychus ulmi (Koch)) and a phytoseiid predator, Typhlodromus pyri (Scheuten) in New York apple orchards. Use of the sequential procedure would result in greater than or equal to 40% savings in sample size for many prey and predator densities. Frequencies of erroneous classification were similar for the sequential procedure and a fixed sample size procedure that used the maximum number of samples that might be taken when using the sequential method. To use the sequential ratio classification procedure, variance-mean models for the prey and predator are required as well as knowledge of the correlation between these two populations. Sensitivity analysis showed that the procedure, as applied to European red mite and T. pyri, is robust with respect to variation in this correlation. Journal of economic entomology. Feb 1988. v. 81 (1). p. 14-21. Includes references. (NAL Call No.: DNAL 421 J822).

1797

Some market power implications of the shipping act of 1984: a case study of the U.S. to Pacific rim transportation markets.
Wilson, W.W. Casavant, K.L. Lincoln, Neb. : Western Agricultural Economics Association. Western journal of agricultural economics. Dec 1991. v. 16 (2). p. 427-434. Includes references. (NAL Call No.: DNAL HD1750.W4).

1798

Spectrophotometric study of bruises on whole red delicious apples.
Upchurch, B.L. Affeldt, H.A.; Norris, K.A.; Throop, J.A. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-6566). 16 p.

Includes references. (NAL Call No.: DNAL FICHE S-72).

1799

Statistical methods for analyzing discrete responses of insects tested repeatedly.
EVETEX. Stanek, E.J. III. Diehl, S.R.; Dgetluck, N.; Stokes, M.E.; Prokopy, R.J. Lanham, Md. : Entomological Society of America. A common study design in entomology involves repeated measurement of a binary-response variable on a set of individual insects or populations under different treatment conditions. An appropriate analysis of such data will allow patterns over time to be compared between experimental groups, while accounting for the correlations among the repeated tests of individuals or populations. We illustrate such an analysis using weighted least squares methods for repeated measurement of oviposition respones of Rhagoletis pomonella (Walsh) adult female flies to two types of test fruit at four ages. We tested for differences in host acceptance behavior of adult flies originating as larvae from naturally infested apple versus hawthorn fruit, and effect (if any) of fly age on this difference. Techniques for model development, analysis of correlation structure, and hypothesis testing are presented. In the particular study considered, there was evidence of a linear increase over age in oviposition propensity for three of four larval-origin/test-fruit groups. The difference between flies of apple versus hawthorn larval origin when tested on apples was shown to be age-dependent, whereas the difference in response to hawthorn was consistent over the range of ages tested in this study. These methods are appropriate for a variety of experimental designs commonly used in toxicological, physiological, behavioral, ecological, and genetic studies of insects. Environmental entomology. Apr 1987. v. 16 (2). p. 3i9-326. Includes references. (NAL Call No.: DNAL QL46i.E532).

1800

The substitutability of domestic and foreign labor in agricultural production.
Adu-Nyako, K. Emerson, R.D. Gainesville, Fla. : The Department. Staff paper - University of Florida, Food and Resource Economics Department, Institute of Food and Agricultural Sciences. Paper presented at the American Agricultural Economics Association Annual Meetings, July 31-August 3, i988, Knoxville, Tennessee. July 1988. (335). i8 p. Includes references. (NAL Call No.: DNAL HD1751.AiS73).

1801

Temperature and wetness duration requirements for apple infection by Botryosphaeria obtusa.
PHYTA. Arauz, L.F. Sutton, T.B. St. Paul, Minn. : American Phytopathological Society. The combined effect of temperature and wetness duration on infection of apple Botryosphaeria obtusa was studied on Delicious seedlings and Golden Delicious apple fruit. The optimum temperature for leaf infection was 26.6 C; at this temperature, 4.5 and 13 hr were required for the pathogen to cause light and severe infection, respectively. Lower temperatures required longer wetting periods for infection to occur, and no infection was observed at 8 C with wetness periods shorter than 48 hr. At 32 C, infection was reduced and a longer wetting period was required for infection than at 28 C. The optimum temperatures for fruit infection ranged from 20 to 24 C; 9 hr of wetting were required for light infection to occur. Infection of fruit required 38 hr of wetting at 8 C, whereas 28 and 32 C resulted in reduced fruit infection. Models were derived empirically to indicate the duration of leaf wetness (W) necessary, at a given temperature (T), for a specified level of infection to occur. For light leaf infection (less than 1 lesion/i00(2) cm of leaf tissue), W = 3527.7T(-2), and for severe leaf infection (greater than 10 lesions/i00 cm(2)), W = 116 - 5380.7T(-1) + 70257.5T(-2). For fruit infection, W = i4.8 - 265.2T(-i) + 2988.4T(2). No infection occurred under field conditions in those instances where no infection was predicted. The leaf infection models accurately predicted the level of 84.7% of the infections obtained under field conditions. In 8.5% of the cases, less disease than expected for the particular combination of W and T was obtained; more infection than predicted was observed in 6.8% of the cases. Most of the incorrect predictions occurred for wetting periods where moderate infection was anticipated. Phytopathology. Apr i989. v. 79 (4). p. 440-444. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1802

Temporal variability in repeated bioassays of field populations of European red mite (Acari: Tetranychidae): implications for resistance monitoring.
JEENAI. Martinson, T.E. Nyrop, J.P.; Denndhy, T.J.; Reissig, W.H. Lanham, Md. : Entomological Society of America. Discrimination bioassays are increasingly being used to detect resistance and estimate the frequency (F) of resistant (R) phenotypes in field populations. The proportion of survivors in discriminating bioassays is thought to measure the frequency of R phenotypes in the population. External factors that cause physiological stress in a field population may alter response to a discriminating concentration and affect estimates of F. Because susceptible (S) phenotypes already die at the discriminating concentration, only the response of R phenotypes changes. Thus, estimates of F will be biased and populations under stress will

appear to be more susceptible than they really are. Repeated discriminating bioassays of the European red mite, Panonychus ulmi (Koch), showed variability in estimates of F. Repeated bioassays of P. ulmi from commercial apple orchards were used to construct a cumulative distribution function that describes the probability that R phenotypes die in the discriminating bioassay. This distribution function was then used in simulations to explore the effect of day-to-day variability in tolerance of R phenotypes on resistance monitoring programs. Journal of economic entomology. Aug 1991. v. 84 (4). p. 1119-1127. Includes references. (NAL Call No.: DNAL 421 J822).

1803

A tentative model to describe the respiration of stored apples.
JOSHB. Andrich, G. Fiorentini, R.; Tuci, A.; Zinnai, A.; Sommovigo, G. Alexandria, Va. : The Society. Using mathematical equations that describe the O2 mass-transfer and the enzymatic oxidation of the organic substrates of apples (Malus domestica Borkh.), we developed a kinetic model to correlate fruit respiration rate with environmental oxygen partial pressure (PO2). The kinetic determinations were carried out at room temperature using apples stored at 3 to 4C for 11 to 19 weeks. Results show that: 1) the calculated value of the Michaelis-Menten constant related to the enzymatic oxidation of the respiratory substrate (Km = 2.1 +/- 0.5.10-5 mol.kg-1) is close to that reported in the literature for cytochrome-c oxidase; 2) the located range of PO2 levels where O2 becomes the limiting factor in the respiration process (near 2.6 kPa at T = 20.5 +/- 1C) is close to those usually used on a commercial scale for controlled atmosphere storage. Journal of the American Society for Horticultural Science. May 1991. v. 116 (3). p. 478-481. Includes references. (NAL Call No.: DNAL 81 S012).

1804

Tufted apple budmoth (Lepidoptera: Tortricidae): simulation of postdiapause development and prediction of spring adult emergence in North Carolina.
EVETEX. Stinner, R.E. Rock, G.C.; Bacheler, J.E. College Park, Md. : Entomological Society of America. In-orchard temperatures and pheromone trap catch data for 21 orchard-year (1976-80) combinations were used to compare the accuracy of physiological time models in simulating and predicting male spring emergence of the tufted apple budmoth, Platynota idaeusalis (Walker), in North Carolina apple orchards. By starting model simulations at the date in which larval postdiapause development was calculated to begin, linear (degree-day) and nonlinear models were accurate within +/- 1 wk in simulating spring flight peaks for 19 and 20 of the 21 orchard-year combinations, respectively. Nonlinear models predict the male spring flight peaks with an accuracy of +/- 1 wk simulated 5-22 d in advance by using actual orchard temperatures during the first 70% postdiapause development of P. idaeusalis and then using 5-yr (1976-80) average hourly orchard temperatures thereafter. Environmental entomology. Apr 1988. v. 17 (2). p. 271-274. Includes references. (NAL Call No.: DNAL QL461.E532).

1805

Tufted apple budmoth (Lepidoptera: Tortricidae): simulation of within-season phenology in North Carolina.
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